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WATER SUPPLY, & SANITARY IMPROVEMENT.

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BY
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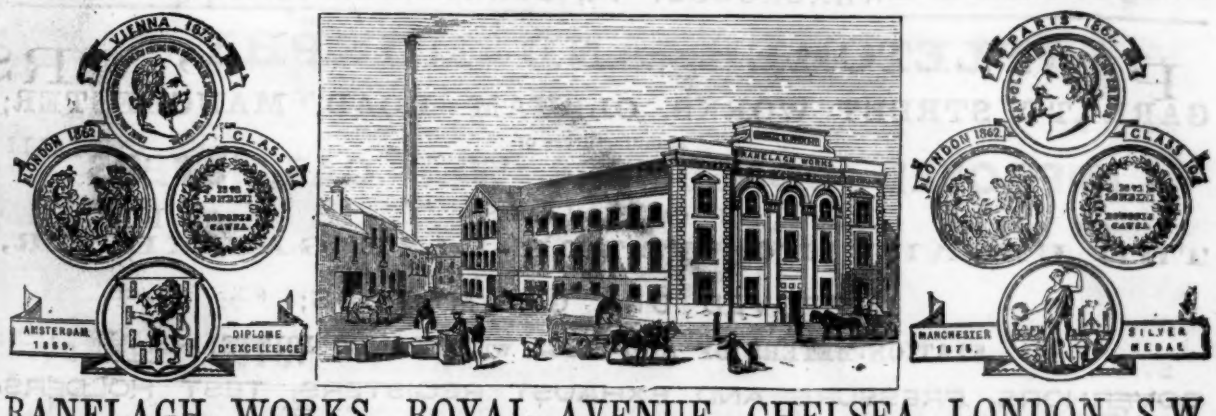

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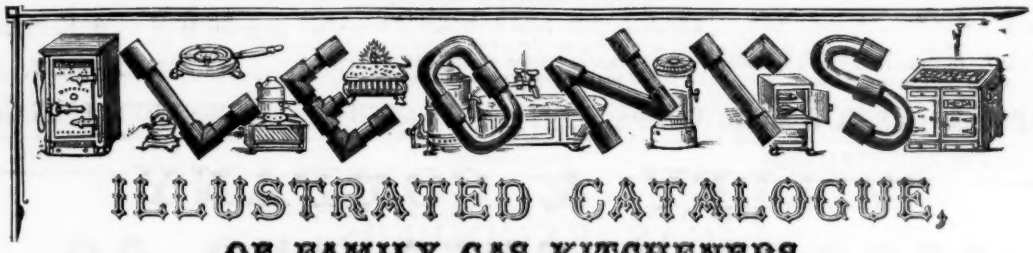

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LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

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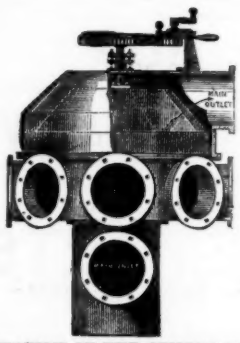
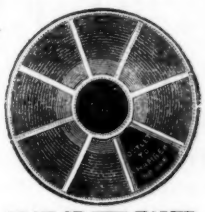
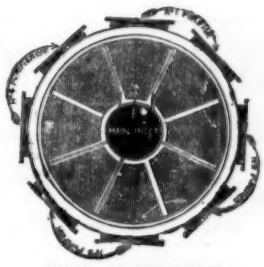
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY.
LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,
And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

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DRY-FACED VALVES
FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

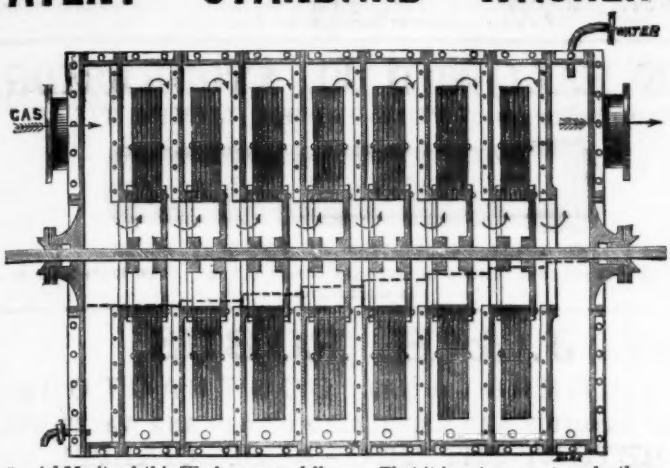
They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

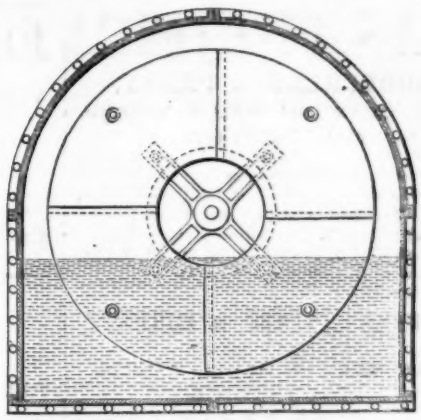
References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER COMPANY.





The Special Merits of this Washer are as follows:—That it is not necessary to reduce the temperature of the gas to 60°, or thereabouts, to make it effective; **and that as no tar is retained in it, the illuminating power is not reduced as in Tower Scrubbers.** That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas as it ascends. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine, as well as a very large quantity of carbonic acid and sulphuretted hydrogen. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

Messrs. KIRKHAM, HULETT, and CHANDLER. *The Gaslight and Coke Company, York Road, King's Cross, Jan.* 14, 1879.

Gentlemen,—In reply to your inquiry, I am pleased to say the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia**, while purifying more Gas than it was intended to do. I enclose particulars of a week's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c., (Signed) JOHN CLARK, Engineer.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 *feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—*

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 7	11	9	7	5½	3½	3	1⅝	1½	½	0	10 Gallons.	59,000	Nil.	74°	66°	31°	25	23½	5
„ 8	9½	7½	6	4½	3	2	1	¾	¼	0	10 „	78,000	Nil.	73°	61°	31°	28	26¼	4½
„ 9	11	9	7	5	3½	2½	1½	1	½	0	10 „	82,000	Nil.	74°	67°	33°	27½	25½	5
„ 10	10½	8½	6½	5	3½	2½	1½	1	½	0	10 „	66,000	Nil.	76°	64°	28°	28½	27	5
„ 11	12½	10	7½	5½	4½	3½	1⅞	1½	½	0	10 „	61,000	Nil.	73°	64°	27°	26½	25½	5
„ 12	11	8½	6½	—	—	—	1½	¾	½	0	10 „	39,000	Nil.	74°	64°	27°	26½	25½	5
„ 13	13	10½	8½	6	4½	3½	2	1½	¾	0	10 „	78,000	Nil.	73°	65°	42°	28	26	5

Messrs. KIRKHAM, HULETT, and CHANDLER. *Corporation of Birmingham, Gas Department, Saltley Works, May* 23, 1879.

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from KIRKHAM, HULETT, *and* CHANDLER'S *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March* 6, 1879.

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				10	9	8	7	6	5	4	3	2	1	
64,000	Inlet	2·00	2·00	158·8	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·15	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

Messrs. KIRKHAM and HERSEY. *The Leeds Corporation Gas-Works, Meadow Lane, Aug.* 14, 1879.

Gentlemen,—In reply to your inquiry of yesterday's date, I have pleasure in stating that the item appearing as income derivable from Ammonia in my estimate of revenue for current year is not an exaggeration. Our average income from Ammonia is 2s. 8d. per ton of coals carbonized, but at the works where your invention is in use we derive not less than 3s. per ton. Since the introduction of efficient Scrubbers at our works the greater yield of this product (now twice as valuable as coke to us) is such that the cost of Apparatus for its extraction can be wholly paid for out of from nine to twelve months gains. I am, Gentlemen, yours faithfully, (Signed) H. WOODALL, Engineer.

Messrs. KIRKHAM, HULETT, and CHANDLER. *Woolwich Equitable Gas Company, Engineers Office, Nov.* 1, 1879.

Gentlemen,—In answer to your inquiry respecting Washer erected here in September last, and which has been working here constantly since Oct. 1, I beg to say that it is working very satisfactorily. We sell over 24 gallons of 10 oz. liquor per ton of coal carbonized, and depend upon your Washer to extract all Ammonia, which it does satisfactorily, not leaving a trace of free Ammonia at the outlet. It takes little power to drive it, and the difference of pressure between inlet and outlet is scarcely noticeable, being less than half an inch. I consider it a very valuable machine, and have little doubt that it will pay for the outlay in a very short time. I shall be pleased to show it to any one that may be in want of such a machine, when they can see its capabilities themselves.—I am, Gentlemen, yours faithfully, (Signed) W. WHITE, Engineer.

Messrs. KIRKHAM and HERSEY. *Heywood Local Board Gas-Works, Hooley Bridge, Heywood, Dec.* 1, 1879.

Gentlemen,—In reply to your favour of the 28th ult., I beg to state that the Scrubber is at work, and doing well. I shall be glad to show it to any inquirers.—Yours truly, (Signed) EDWIN BUCKLEY, Engineer.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Dec.* 19, 1879.

Gentlemen,—In accordance with my promise that I would inform you as to the working of the "Standard" Washer erected by you here in June last, I now write to say that we are passing through it 100,000 cubic feet per hour (the quantity for which it is made) direct from the Condensers, "bye-passing" the whole of our Scrubbers, which, not being needed, have been standing still since the "Standard" Washer was put in use. It seems as though the Washer more effectually removed the Ammonia when taking the full quantity of gas than less; as, at the present time, at the sixth chamber (there being eleven in all) not a trace can be discovered either by turmeric or acid litmus paper. The difference in pressure between inlet and outlet is only ten-tenths of an inch. I need scarcely say, after the above, how perfectly satisfied I am. (Signed) P. J. WATES, Engineer.

For further particulars and testimonials, address Messrs.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

MOBBERLEY & PERRY,
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Manufacturers for Home and Export.
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BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

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SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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FOR
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Are the Sole Manufacturers of
Archer's Patent Hoists,
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The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

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FOR
REMOVING AND PREVENTING INCRUSTATION OF EVERY DESCRIPTION OF STEAM BOILERS; ALSO CORROSION.

Manufactured only by
WILLIAM RICHARDSON,
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MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS,
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MANUFACTURERS OF
GAS-RETORTS, FIRE-BRICKS, &c.,
Which have been extensively used for 30 years in the construction of Glass Furnaces, where the heat is five times greater than in Gas Ovens; superior to any Retorts or Fire-bricks in the market for standing intense heats, and not contracting.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

J. & H. ROBUS,
BUILDERS AND CONTRACTORS
FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,
RETORT-SETTING—A SPÉCIALITÉ.
ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.
ESTIMATES GIVEN FOR MAIN-LAYING.
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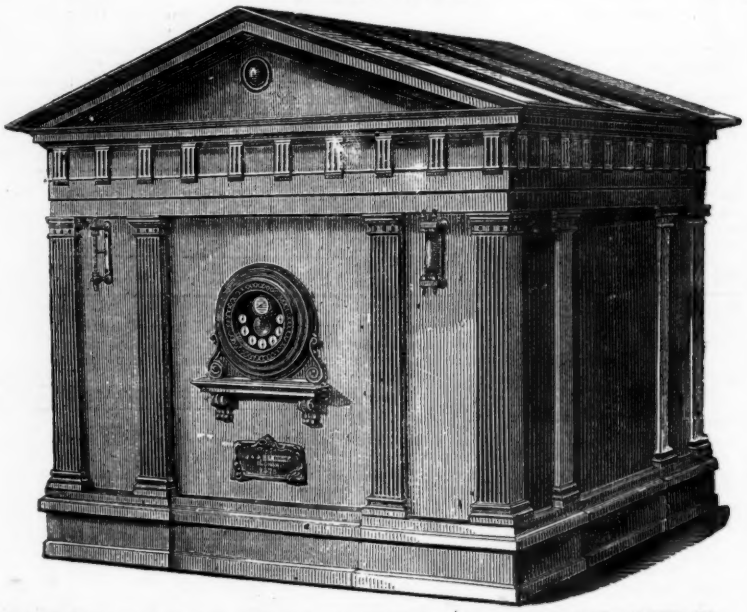
J. & J. BRADDOCK,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET & DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
BRADDOCK'S PATENT COMPENSATING GAS-GOVERNORS;
ALSO LICENSEES AND MANUFACTURERS OF
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;
ROUND STATION-METERS,
ON CAST-IRON STANDS.



SQUARE STATION-METERS,
WITH PLANED JOINTS.
GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.
GAS COOKING APPARATUS.
Home and Foreign Orders promptly attended to.
All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.
Orders almost invariably despatched on the day of receipt.
TERMS, &c., ON APPLICATION.

TANGYE BROTHERS AND HOLMAN,

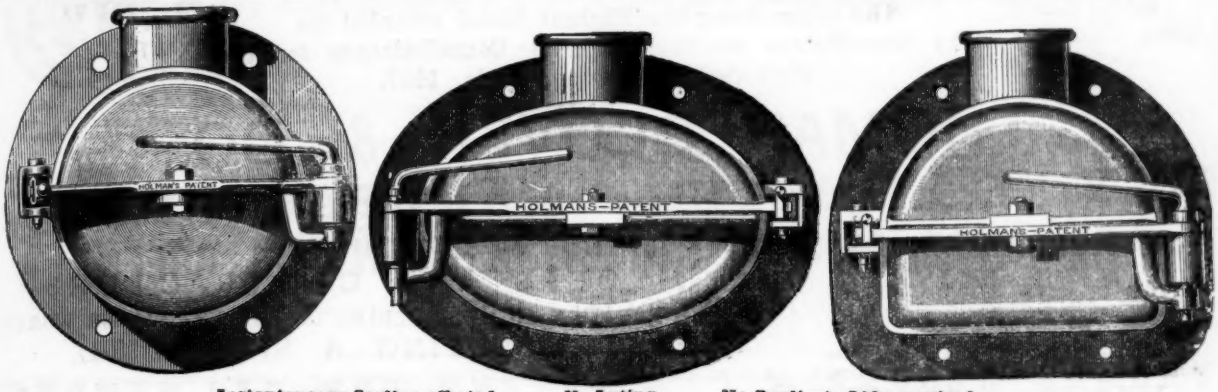
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland)

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal Advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Menton (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

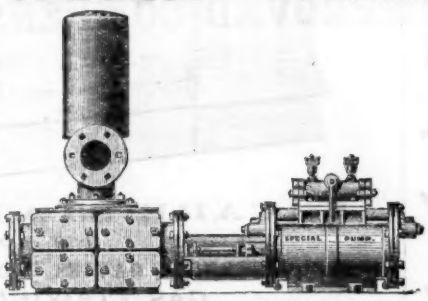
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	21
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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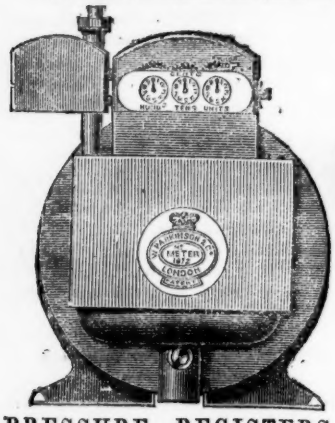
THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

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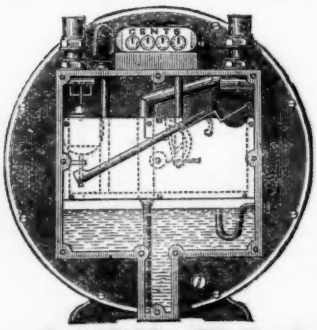
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 10, 1880.

Circular to Gas Companies.

We are at present without any further information as to the progress of the scheme which is to sanction the amalgamation of the Phœnix and South Metropolitan Companies. It is, we believe, understood that everything required by the Board of Trade has been acceded to by the Companies, and the only reason we can imagine for the delay is that the officials of the Board are so much occupied with the preparations for the parliamentary campaign that they have no time to devote to the final consideration of the scheme, before recommending it for confirmation by the Privy Council. An announcement may, however, be expected in a few days that the scheme has really been sanctioned. The opposition made by Local Authorities has been small—confined, in fact, to that of one Vestry, who saw as the possible consequence of the union a delay in the reduction of price in the original district of the South Metropolitan Company. This purely selfish view of the matter has very properly been disregarded, and when the amalgamation is effected we shall find the combined undertaking with one initial price and one charge for gas.

As our readers know, the South Metropolitan and Phœnix Companies are promoting Bills for, to a certain extent, identical purposes. For instance, the Phœnix Company will, in the course of time, require extensive additional works, and land upon which to erect them. They have chosen a site in the parish of Greenwich, nearly opposite Beckton, which may possibly, in the future, be designated "Hornerton." This land is admirably suited in every respect for the purposes of the Company, and we hope they will be enabled to acquire it; but supposing they should fail, there is another "shot in the "locker." The South Metropolitan Company are in Parliament to obtain the same site. There is, besides, a proposition on the part of both of the Companies concerned to raise additional capital to the extent of £1,000,000, with borrowing powers to the amount of one-half that sum. Against both of these Bills the Metropolitan Board of Works, at their meeting last Friday, decided to petition, on the ground, first of all, that such an extent of land as is proposed to be taken is not required for the purposes of the Companies; and, secondly, that the amount of capital asked for is excessive. On both these points we would join issue with the Board. In the first place, land in the neighbourhood of the Metropolis is being so rapidly covered, that the Gas Companies cannot too soon seize upon vacant spots which may, at a no very distant future, be required for the sites of new works. Then with respect to the new capital of £1,000,000, which the Metropolitan Board regard as excessive, no one can look upon the rapid development of the gas industry in the Metropolis, and contemplate the possible wants of future gas consumers, without recognizing the fact that a large amount of capital must be required to enable the Companies to keep pace with the ever-growing needs of their districts. An attempt will also be made, as regards the South Metropolitan Company, to get their present initial price for gas reduced. Opposition to the Bill of the Phœnix Company was, of course, to be expected; but as we hope it will not be necessary to proceed with this measure, the proposed opposition to it need not now be further dwelt upon.

With regard to the London Gaslight Company's Bill, the Metropolitan Board very charitably refrain from opposition, further than asking Parliament to limit the capital to be employed in the stove business to £25,000; while, as a matter of course, the Board seek to have the Wandsworth and Putney Gas Company brought under the most recent legislation. With respect to the Bill of the Corporation of the City of London, a severe snub is administered to the promoters, who are told in plain terms to attend to the affairs of the City, and leave the interests of the outside districts to be taken care of by the Metropolitan Board of Works. How far the Board will succeed in their obstructive policy remains to be seen. We have little doubt that the South Metropolitan Company will carry their Bill—most certainly so if the amalgamation scheme is sanctioned. The Wandsworth and Putney Bill will no doubt be altered—not exactly at the bidding of the Board, but in deference to Earl Redesdale and Mr. Raikes. Thus it will be seen that the Board have cut out for themselves a good deal of work, with relation to gas affairs, during the present session of Parliament.

The report of the Directors and the accounts of The Gaslight and Coke Company for the past half year have been issued, in anticipation of the ordinary meeting to be held on Friday next. It goes without saying that the Company, now the largest in the world, is in a highly prosperous condition, and is likely to progress at a still more rapid rate in the future. Every day adds to the number of the customers, and this must continue to be the case, so far as we can see, for long years to come. Perhaps the best indication of the increase in the number of consumers is afforded by the considerable addition to the receipts for meter-rents—viz., £633 —during the past year. A further proof is evidenced in the amount of coals carbonized. Thus we find that in the last half year the quantity of coals carbonized was 598,477 tons, being an increase of 30,237 tons upon the amount of the corresponding half of 1878. The make of gas has, of course, in like manner increased. The figures which show us the amount of gas made are formidable; but here we shall simply mention that the increase in the quantity of gas manufactured during the past half year over the corresponding period of the previous year was no less than 266,514,000 cubic feet. It should be said that from every ton of coal carbonized, 10,160 feet of gas were obtained. Of the prodigious quantity of gas

made, the greater part is accounted for, the loss amounting to only about 5½ per cent. The revenue account further illustrates the progressive prosperity of the Company. The increase in the amount received for gas sold for private consumption was no less than £31,221. We may note here a curious fact, that while a large number of additional public lamps were erected, there was a decrease of £225 in the sum received for gas supplied to them. This may, perhaps, be accounted for by the parsimony of the parishes who burn by meter, and who have reduced the hours of consumption, much to the dissatisfaction of many of the inhabitants. This and an unfortunate decrease in the amount received from the sale of coke (£15,202) form the only discouraging features in an otherwise highly satisfactory balance-sheet. It is much to be regretted that the efforts which the Directors have made to promote the sale of coke have not been more successful; but the fact is the quantity produced is now so enormous, that it is scarcely to be wondered at that an outlet cannot be found for anything like the whole of it. We have more than once recommended the Company to try the manufacture of artificial fuel, as one means of getting rid of a portion of this important residual, and we may here repeat the suggestion. The practice of working up tar for products, which we pressed upon the attention of the Company for several years, has turned out, as we were certain it would do, highly successful. The receipts for tar and tar products have increased by £53,025. "Tar "products" for the past half year figure in the accounts for £34,615, which seems to indicate that their manufacture must be very profitable. We may presume that the Company have not the means of working up the whole of the tar produced at all their stations, otherwise the receipts under this head must have been much more considerable. Ammoniacal liquor and sulphate of ammonia yielded a considerable increase—viz., £3314; but this increase is easily accounted for by the additional amount of coal carbonized. The total receipts for the half year amounted to £1,301,049, which is an increase of £72,158 over the same period of the previous year. Naturally, under the circumstances we have stated, the additions made to the income have involved additional outlay. Thus, coals cost £19,186 more than they did in the corresponding half of 1878. The more coals carbonized and the more gas made, the greater is the cost for wages and for purification, under both of which heads an increase in expenditure is shown. The total expenditure for the half year was £896,618, being an increase of £38,648 over the corresponding half of 1878. Thus the balance to be carried to net revenue account amounts to £404,430, which, with the balance carried over from June last, gives a total sum of £516,357. The amount required to pay interest on debentures, preference shares, &c., is £147,164, which leaves a sum amounting to £369,193 applicable to dividend on the ordinary "A" stock. When the dividend recommended in the report, at the rate of ten and a half per cent. per annum, has been paid, there will remain a sum of about £150,000 to be carried to reserve. It is very satisfactory to see that all the reserve-funds of the Company show a considerable increase.

We may here take a glance at the capital engaged in this huge concern. Briefly stated, the amount of share capital paid up on Dec. 31, 1879, was £7,372,745, which leaves £892,255 still to be issued under the authority of their Act of 1876. The Company have been very successful in raising capital under both the auction and tender systems. The public auction in June last had not, perhaps, all the success that could have been desired; but whatever was deficient was amply made up when an experiment was made with the "tender" system. In this case £100,000 of ordinary "A" stock was offered at a reserve price of £176 for every £100 issued, and brought applications for nearly twice the sum offered. The outside public, we understand, did not tender freely, and the greater part of the sum was allotted to existing proprietors, from whom the bulk of the applications came. This shows the confidence the proprietors have in the stability of the undertaking. The auction and tender systems have brought a new item into the capital account—viz., "premium capital"—which already amounts to £80,516; and this, as our readers know, bears no interest. The sum already borrowed by the Company amounts to £1,643,510, leaving £917,990 still to be raised by way of loan.

The gas accounts of the Corporation of Birmingham for the past year are not yet ready, but at a meeting of the Town Council last week the estimates for the present year were discussed, and it was stated that the accounts relating to the gas undertaking would probably this year show a surplus of £25,000, which it was proposed to hand over towards the improvement rate. We shall not again, as we have done previously, dispute the propriety of this appropriation, for it may be said that the Corporation of Birmingham have a right to do what they like with their own. Some members of the Council seem to regard the appropriation as a simple payment of rent for the use of the roads. The Gas Companies who formerly supplied Birmingham of course did not pay anything by way of rent, and thus, in the eyes of some, sold gas "unfairly cheap." On this point we need only remark that if the Companies were in possession of the gas supply at the present time, gas in Birmingham would in all probability be "unfairly" cheaper than it is at present. However, there is nothing any one could possibly allege against the management of the undertaking. The Gas Committee have their hearts in the work, and if all their doings are not exactly in accordance with our views, we must perforce credit them with the utmost honesty of purpose.

The Cambridge University and Town Gaslight Company recently held their half-yearly meeting, at which full dividends were, as usual, declared. We are always disappointed, on these occasions, when we do not have a speech from the eminent Chairman of the Company—the Rev. Dr. Phelps—whose knowledge of gas affairs is so intimate, and whose defence of gas interests is so vigorous. But at present there is not, out of the Metropolis, any "burning question" at issue, and we have no doubt that the Doctor's last speech, on the economic use of gas for other than illuminating purposes, had its effect in adding to the prosperity of his Company.

The York United Gas Company last Thursday held their half-yearly meeting, at which, as usual, full dividends were declared. The Company enjoy the continued prosperity they deserve. The increased demand for gas in York has necessitated the remodelling of a portion of the retort-house, and urges the Directors to press on their new works at Layerthorpe, a commencement of which seems to have already been made. We are glad to find that the Company have obtained better railway accommodation for the carriage of their coals to the works, so that the cartage of 25,000 tons a year through the streets is now avoided, to the great satisfaction of the citizens and the preservation of the highways.

It appears likely that the Bill promoted by the Eastbourne Gas Company will be allowed to pass without serious opposition. The Local Board wish for a pressure higher than that proposed in the Bill; but as the Company know their own business best, they very properly refuse to comply. They state that the pressure at which gas is generally supplied in London should satisfy the inhabitants of Eastbourne, and they might explain to the Local Board that excessive pressure means leakage, and leakage necessarily adds to the cost of manufacturing, and therefore of supplying gas. Tradesmen in the town object to the Company's proposal to furnish gas-fittings, &c., to their customers. On this point we hope the Company will persevere, and thus give the gas-fitters some instruction as to what constitutes good apparatus.

Death of Mr. F. Brothers, of Chorley.—We have just learned of the death, on Tuesday last, of Mr. Francis William Brothers, the Manager of the Chorley Gas-Works. He died somewhat suddenly, after an illness of only a few hours, though he suffered periodically from ague, contracted whilst in India a few years ago. He was a young man of much promise.

The Reported Explosion at the Windsor Gas-Works.—In reference to the paragraph which went the round of the London papers last week, purporting to be an account of an explosion at the Windsor Royal Gas-Works on the previous Sunday night, we hear that no such accident happened. The facts of the case are that one of the old gasholders at the works was thrown out of use for the purpose of being pulled down, and a small quantity of gas ramaining in the holder, accidentally became ignited, at a hole which had been broken in the crown, through coming in contact with a fire used for the purpose of thawing ice in the tank. When the gas became ignited it burnt with much brightness for a few minutes, and then went completely out. Mr. Wadeson, the Manager of the works, assures us that no explosion was caused and no damage done.

Sale of Shares in the Great Yarmouth Gas Company.—An esteemed correspondent—Mr. R. P. Spice—sends us particulars of the prices realized at a sale of shares in the above-named Company, on Thursday, Jan. 9. Mr. Spice writes: "I thought it might be a matter of interest to some of your readers to know how shares in well-managed country gas undertakings are appreciated in these days of false alarms and Edisonian impulsiveness. The old shares are entitled to *no more* than 8½ per cent. dividend; and the new, 7½ per cent." There were 27 shares sold at the following prices:—

10	original	£30	0	shares, average price	£53	0	0	per share.
5	"	30	0	" "	52	10	0	"
5	"	7	10	" "	13	3	9	"
7	new	30	0	" "	48	0	0	"

Yesterday's Prices of Gas and Water Shares.—Mr. A. G. Prater, Stock and Share Broker, of 23, Cornhill, gives the following as the closing prices yesterday of some of the principal gas and water shares:—

Gas Companies.		*Water Companies.*	
Commercial	180 —183	Chelsea	200 —205
Continental Union	18½— 19	East London	199 —202
Crystal Palace District	170 —175	Grand Junction	115 —118
European	17¼— 17⅝	Kent	280 —290
Gaslight and Coke "A"	179 —181	Lambeth	200 —205
Imperial Continental	177 —179	Southwark & Vauxhall	199 —202
London	175 —178	Do. 5 per cent. pref.	125 —129
Phœnix	35 — 35½	West Middlesex	178 —182
South Metropolitan	195 —200		

Water and Sanitary Notes.

On Thursday evening last Mr. Cross announced in the House of Commons his abandonment of the private Bill which was advertised last November to be promoted for the acquisition of the Metropolitan water undertakings, and which has been referred to in these columns, and stated his intention to proceed by a public measure, which he hoped to introduce at an early date. This measure he proposes should be read the first and a second time, and then be referred to a hybrid Committee, before whom all opposing parties can be heard. Although Mr. Cross made no statement as to the terms which had been arranged between the Government and the Companies, it is understood that these are the capitalization of dividends, due regard being had to prospective profits on an increasing business. It is not surprising that the Companies should have acceded to these terms, but possibly their acquiescence is merely provisional. A great deal more will have to be settled before the undertakings are vested in that Trust which has yet to be constituted. As to its constitution, we have at present no intimation from the Home Secretary; but there is a curious idea put forward, which may perhaps suggest the composition of the Trust. The Shareholders in the Water Companies are to receive in exchange for their shares the equivalent of their capitalized dividends in "Water Stock," to be provided by the Government. But in some quarters there are evidently doubts whether the profits of the undertakings in the hands of a Trust will be equal to meet all the pecuniary obligations involved. It will, therefore, be necessary to give the Stockholders some guarantee for the regular payment of their interest, beyond the doubtful profits of the undertaking. This guarantee is, we know, in all cases of Corporation purchases, the security of the borough rates. Now, the idea to which we have above alluded is to make the local rates of the Metropolis the necessary security. We do not notice that this proposal has yet got abroad, but when it does, and it is seen that the Trust is not to be a representative body, we can easily imagine that a considerable uproar will ensue. We regard it as improbable, that with good management there will ever be occasion to call upon the rates to supply any deficit. But the vestrymen will say that unlikely things do sometimes happen, and it may be that, after a few years, a "precept" will be issued by the Trust, calling upon the Vestries to furnish a certain sum of money to make up a deficiency in revenue. If the Trust is to be composed of Government nominees, it may be considered as certain that great dissatisfaction would be expressed by vestrymen when money was asked for. We shall be told once more that "representation and taxation must go together;" and for our own part we shall share the feelings of the vestrymen.

Mr. Cross has also renewed his assurance that when the actual price to be paid for the water undertakings is settled, no regard will be given to the inflated prices of shares, such as have obtained since the announcement of the intended purchase was made. But is it certain that Mr. Cross's valuers can settle the terms when the Bill is to come before a hybrid Committee? We quite agree with him that no regard should be paid to the fancy prices given for shares by mere speculators. Only the interests of real investors are to be considered in the transaction; and, so far as we can see, these are satisfactorily provided for in Mr. Cross's scheme. This announcement may cause a flutter upon the Stock Exchange; but we believe that the resolution of the Home Secretary will give general satisfaction to the Metropolitan public, and also to *bonâ fide* investors. We may leave the matter here, for in the course of a week or ten days we are promised a full revelation of the intentions of the Government with respect to the purchase, and when these are announced, the subject will require a fuller discussion than we are able to give it to-day.

There is one phase of this matter to which we have not before referred, but to which we may now devote a few words. How is the Metropolitan householder to benefit by the transference of the water undertakings from, as has been said, one "despotism" to another? The same, or possibly higher rates will have to be paid; more stringent regulations, involving much domestic *espionage*, will most certainly be insisted upon; expenses for altering fittings to receive a "constant" supply at such a pressure as will take the water to the top floors of the highest houses in the district, and even over the roofs, will have to be incurred, and a heavy public rate will perhaps be added to the domestic rate. This is what the Metropolitan ratepayer has to look forward to, under the projected new *régime*. Perhaps, however, the change may not come so soon as is commonly expected.

We notice that the Metropolitan Board of Works have resolved to petition against the Bill of the Southwark and Vauxhall Water Company, which is promoted to allow of the amalgamation of all or any of the Metropolitan Water Companies, and to enable the Company themselves to raise further capital. It might be expected that, in the present position of water affairs in the Metropolis, the Bill would be withdrawn; but we hope such will not be the case. It may be, as hinted above, that a continued existence is before the Companies, and we trust the proposals of the measure we now refer to will be put fairly before the House.

The annual report and statement of accounts of the waterworks department of the Manchester Corporation have been presented to the City Council, but we are at present in possession of only a mere abstract of them. From this, however, we gather that the undertaking was last year a losing concern—a circumstance which is not to be wondered at when we consider that depression of trade seriously affected the supply for trade purposes, which fell off to the extent of 105 million gallons. The deficit, however, is comparatively inconsiderable, amounting to only £5306—a sum scarcely worthy of notice when we find that the rental for the past year amounted to £137,231. The works of the Corporation are, for the most part, in excellent order; but in the Torside reservoir there is a troublesome crack, which, we may take it, will speedily be effectually stopped. The Denton extensions are progressing favourably. These works are very extensive, and will, when completed, prove of great service to the district. But for all this the Water Committee must be longing to commence the Thirlmere scheme, respecting which we shall probably find something when we have the full report of the Committee before us. However, what we already have is sufficient to show the wisdom of the Corporation in promoting that scheme.

The York Water-Works Company held their ordinary half-yearly meeting on Thursday last; and the proceedings were most satisfactory. It is hardly necessary to repeat what we have often had occasion to say before, that the position of the Company is one which must be gratifying to all concerned, whether Shareholders or Managers. The former will be satisfied with receiving liberal dividends, ranging from five to eight per cent., free of income-tax, after which a considerable balance is left to be carried forward. The works of the Company are maintained in an admirable state of repair, those recently constructed at Acomb Landing being completed, and are now, indeed, in actual use. The Company, for the most part, live very happily with their customers and the Corporation, and very few complaints are heard of. Grumbling naturally occurs about the breaking up of the streets, but it is shown that the disturbances last complained of were rendered necessary by the effects of the frost.

Political economy is generally called the Dismal Science; but we very much question whether the Science of Meteorology may not be considered as still more dismal. We have spoken of meteorology as a science, but we cannot help thinking that its claim to be recognized as such is not fully substantiated. At the present time meteorologists can do little more than record occurrences which are of vital interest to humanity, but over which man can exercise little or no control. Thus accurate registers are kept of the amount of rainfall in different parts of the country, and these have a certain value, but they do not assist us in preventing either droughts or floods. We know, after the event, that a low rainfall may occasion much discomfort and even famine, while a high one may produce devastating floods, which sweep away crops, flocks, and even homesteads.

We should remark here that we have before us the valuable compilation by Mr. M. Ogle Tarbotton, the eminent Borough Engineer to the Nottingham Corporation, on the meteorology of Nottingham and its district during 1879. We have records of the force of the wind which may prove of great value to engineers, but no one can say that a stronger gale than the last may not strike the projected Tay Bridge, and effect a similar demolition of the new as of the original structure. Nevertheless it is well that engineers should know to what force the wind may extend, in order that they may provide against calamitous consequences when buildings are constructed of insufficient strength to resist the wind-pressure. Again, it is quite as well to know the thermometrical readings, but these do not afford us any possibility of changing the temperature one degree outside our houses. In fact, when man finds himself face to face with the powers of Nature he is utterly helpless. And yet meritorious attempts are being made to collate daily records obtained in different parts of the globe, and from them draw inferences as to the probable weather to be expected within a certain

number of hours, and even days. In these, the observations of the barometer and the direction of the wind play an important part; and we are bound to say that the vaticinations of the meteorologists are sometimes fulfilled. But here again we have to notice the powerlessness of man to cope with the elements. Notice is sent to various ports that a storm will probably arise on a certain day. Ships in harbour may lie safe at their anchorage; but how do the prophecies avail those who have to encounter in mid-channel a violent storm, such as may have been predicted? So, at home, rainstorms may be prophesied; but who is to prevent their coming, and of what use are the prophecies except to caution a man to carry his umbrella? It must not be supposed, however, that we at all despise the labours of the gentlemen who make the observations and record them. Their efforts to provide materials which may some day lead to the constitution of a science of meteorology are beyond all praise. Among these, Mr. Tarbotton holds a prominent place, and the annual record of the observations made by him and his friends in the Valley of the Trent constitutes a really valuable compilation.

We may also notice that observations of the rainfall at their several reservoirs are diligently made by the officers of the Corporation of Halifax, and duly recorded and published. The report for the past year shows that in the course of the twelve months, as might have been expected, Halifax was well provided with water. From the report of the work done during the same time, it is shown that the water undertaking is in a highly satisfactory state.

The Corporation of Liverpool are now carrying out an idea which was projected a year or two ago. The town refuse is of too extensive a character to be dealt with by ordinary means, and moreover we believe there are enormous accumulations which require removal. Under these circumstances, the Town Council have resolved to embark the refuse, and take it—not exactly out to sea, but far enough down the Mersey to prevent regurgitation to Liverpool. The steamer which the Corporation have specially had built for the purpose, made its first trip a few days ago, and successfully shot a cargo of refuse into the water. What rigid economists will think of this waste we shall not pretend to say.

URBAN WATER SUPPLY.

In the last article under this head (*ante*, p. 163) we placed before our readers a summary of the facts recorded in the recently published Return on this subject, so far as regards the towns on the Severn in that part of the drainage area of the river situated on the right bank. We now proceed to consider the state of the water supply in the towns on the left bank, many of them populous and important. They are on sub-drainage areas for the most part situated on the new red sandstone, the rivers rising in and flowing over that rock. In the small valleys of the northern feeders, however, and also in that of the Lower Avon, the rocks near the river sources are older and of different geological date.

The Vyrnwy is the first tributary of the Severn. In its drainage area are three towns, of which only Oswestry appears in the return. Oswestry has a constant supply of about 34 gallons per head per day from reservoirs collecting surface water at a distance of nine miles from the town. The water is, no doubt, excellent. The works have cost a sum equivalent to 36s. per head of population, and the charge is 2·1d. per thousand gallons. It is said that extra storeage is required.

Of the water supply of the various towns in the Perry, Tern, and Worf sub-drainage areas, which include a large tract of country, chiefly agricultural, in the northern part of the Severn catchment, no detailed account is given in the return. There are eight towns in this district. Three of them —Ellesmere, Whitchurch, and Dawley—are supplied by wells, but have no works. Wellington is supplied from a small rivulet, but the quantity taken is not stated. Newport (in Salop) is named, but no information given. Market Drayton, Wem, and Shifnal are omitted altogether.

We come next to the Stour, a small but important drainage area, on which is a crowded population grouped into several towns connected with important mining and manufacturing industries. Wolverhampton is built on the line of watershed separating the Stour from the sources of the Tame, and about half the population is within the Severn drainage, and the other half belongs to the Trent. The water supply is drawn partly from the little river Worf, a tributary of the Severn, and largely from deep wells sunk in the new red sandstone, one of them to a depth of 918 feet. The Worf water is strained, but not filtered. There is a constant supply to the town of 17½ gallons per head per day for domestic purposes. The cost of works has amounted to nearly £3 per head of the population supplied, and the average charge for water appears to be at the rate of about 6·2d. per thousand gallons. Besides the town itself, Wolverhampton supplies several towns in the Trent drainage area. Additional pumping plant and storeage are required. The works were long since purchased by the Corporation from a Company by whom they were started. Dudley is still in the hands of a Company, who are supposed to supply 20 gallons per head per day, but no information is given as to details. Stourbridge, also a Company's town, has a constant supply from wells in the new red sandstone, the water being pumped into a service reservoir. The quantity available is said to exceed the rate of 40 gallons per head per day, but the actual quantity supplied is not stated. The works, which supply beyond the immediate town, have cost £22,000 (rather less than 40s. per head of the population), and the charge, as far as it can be deduced from the water-rate, and estimated on the population of the town, appears to be 4·4d. per thousand gallons. This, however, is little more than an approximation. Additional works are now in construction. Kidderminster has a constant supply from a well in the new red sandstone, the water being pumped into a reservoir. The yield is said to be 630,000 gallons per day, and the demand only 400,000, being at the rate of 20 gallons per head per day. The cost of works has been about 22s. 6d. per head of population, and the charge is 3·3d. per thousand gallons. Halesowen, in the same watershed, is not referred to.

We come next to the important drainage area of the Upper Avon, with its numerous towns and large population. Rugby has a constant supply of filtered water from the Avon, a trial having been made without success to obtain good spring water. The quantity supplied is 20 gallons per head per day. The works have cost about £3 per head, and the charge is at the rate of 4·8d. per thousand gallons. Leamington takes its water from the small stream on which it stands, the water being filtered, and a constant supply of nearly 30 gallons given. The cost of permanent works has been only about 13s. 6d. per head of the present population, and the charge for water is 3·7d. per thousand gallons. Coventry has a constant supply of about 20 gallons per head from artesian wells in the new red sandstone, at a charge of 4d. per thousand gallons. The cost of works was less than 20s. per head, calculated for the present population. Warwick is supplied by tapping a deep sand-bed at a distance from the town, and conveying the water thence by gravitation. The supply is constant, and somewhat exceeds 20 gallons per head per day. The cost of land and works has been about 40s. per head. The charge is 2·8d. per thousand gallons. Of other towns, Kenilworth, Stratford-on-Avon, Evesham, and Redditch are supplied by wells, but are without public works of any kind. Pershore, Alcester, and several smaller towns, are not included in the return. The town of Cheltenham, till lately supplied by a Company, has now, by purchase, passed into the hands of the Corporation. Hitherto there has been an insufficient supply of spring water from the Cotswold Hills, supplemented on occasion by well water from the town. No arrangements for future supply are completed. Stroud, on the Stroud Water, has an intermittent supply from springs, collected into reservoirs. Only about 8½ gallons per head per day are distributed, at a charge of nearly 9d. per thousand gallons. The cost of works was about 30s. per head of population. Minchinhampton and Painswick, in the same sub-drainage area, are not included in the return.

We come now to the drainage area of the Lower Avon, the sources of which are chiefly derived either from the oolitic hills of the Cotswolds, the newer rocks to the south, or the mountain limestone of the Mendips. The number of towns in this district is large, and several populous towns are included, some of them important for manufactures. Very little information, however, is given in the returns with regard even to those included, while seven of the number are not alluded to. Bristol is the largest and most important town in the district. It has a constant supply from springs, the water being collected into reservoirs before distribution. No information whatever is given with regard to this important town. The populous suburb of St. George and the town of Horfield are supplied from Bristol. Bath, the next largest town in this district, has an intermittent supply of 25 gallons per head from springs from the oolitic sand, collected into reservoirs. The cost has amounted to nearly £2 10s. per head of population, and the charge for water is 4·3d. per thousand gallons. Trowbridge, also a large town, has a constant supply from the Biss springs, flowing from the chalk about six miles from the town. The springs are said to yield a minimum of 600,000 gallons per day, but the quantity used is stated at

only 5 gallons per head per day. A capital exceeding £3 per head of the population has been expended in works and other expenses, and the water-rate raised shows a cost of 1s. 5½d. per thousand gallons on that small amount. No explanation is afforded of this anomaly. Chippenham receives a constant supply of nearly 18 gallons per head per day from an artesian well which yields 210,000 gallons per day. The cost of works has rather exceeded 30s. per head of population, and the charge for water is nearly 3d. per thousand gallons. This completes the list of towns of which any details of water supply are given. We learn, however, that Malmesbury is negotiating for works, and that works are projected for Bradford. Tetbury, Calne, Midsomer Norton, and Radstock are supplied from wells, and no public works exist or are in contemplation. Frome, Wootton Bassett, Corsham, Melksham, Keynsham, and some smaller towns, are not included in the returns. The town of Yeovil, situated on the Yea, within the drainage area of the Severn, is in like manner not included in the returns.

Beyond the drainage area of the Severn, but entering the Bristol Channel from the north, there are rivers of inconsiderable magnitude, within the catchment areas of which are some large towns. The most populous of these towns are Neath, Swansea, Llanelly, and Carmarthen. The towns of Bridgend, Aberavon, Kidwelly, Llangadock, Llandilo, and Llandovery are smaller, but not without importance. Neath has a constant supply—except in dry summers, when water is most needed—from the natural drainage of a tract of about 300 acres, the water being collected and stored in reservoirs, and filtered previous to delivery. In ordinary times the allowance is nearly 40 gallons per head per day. The cost of works is equivalent to about £3 12s. per head, and the charge is 4·1d. per thousand gallons. Swansea has an unfiltered intermittent supply of nearly 30 gallons per head per day from two streams, the waters being retained in reservoirs in the upper country, and sent down by gravitation. The cost of the works has been about £5 per head of population. The charge per thousand gallons is 3·8d. Llanelly is said to be supplied with 60 gallons of water per head per day, the works being calculated to yield more than twice that quantity. Two streams are utilized, the waters being collected into reservoirs for distribution. The cost of works was £5 6s. 6d. per head of population, and the charge appears to be 3·4d. per thousand gallons. Carmarthen has an intermittent supply of nearly 20 gallons per day, derived from land springs and surface water conducted into reservoirs, one of them being estimated to hold 50 days supply. There are also wells—thirteen of them tube wells, and two of them dug. The cost of works has been very small, equivalent to only 13s. per head of population. The charge is also unusually small, being only 1·8d. per thousand gallons. Of the other towns, Bridgend is to some extent supplied by a Company, but has other resources, and the particulars of supply are not given. Aberavon is constructing works. Llandilo and Llandovery have supplies, the former from wells, the latter from springs. At Llandilo there are distributing works which have cost about £2 per head of population, but no further information is given. Llandovery has not any works.

The whole number of towns in the drainage area of the Severn, for which satisfactory returns have been made, is thus only 28, out of a total of at least 128. In rather more than half of these the quantity supplied is normal, or between 15 and 30 gallons per head per day; in nine it is excessive, varying from above 30 to 55 gallons; while in four it is altogether inadequate. The cost of works per head of population is not excessive in any, the highest being Malvern (95s.), accounted for by the exceptional requirements of a watering-place. The charge per thousand gallons is very large at Trowbridge only, and that owing to the very small quantity of water supplied. It generally ranges between 2d. and 6d., rising above 8d. in only three towns. About forty towns provided with sanitary authorities have either no public provision whatever for water, or have not made any return. In the drainage area of the Welsh rivers draining into the Bristol Channel there are four important towns. In two of them the supply is normal, and in the other two excessive. The cost of works is high in three of the four, and the charge for water moderate. In one (Carmarthen) the cost and charge are exceptionally low.

Presentation to Mr. C. Broadberry, of Harwich.—On Wednesday, the 28th ult., on the occasion of his leaving Harwich, where he had been Manager of the gas-works for nine years, Mr. C. Broadberry was entertained at dinner by a number of his friends, and afterwards presented with a handsome electro-plate cruet frame and stand, as a mark of the respect in which he was held in the town. Mr. Broadberry is going to Waltham Abbey to take charge of the gas-works there.

A STATEMENT BY MR. EDISON.

We had occasion, in a recent number of the Journal, to draw attention to an article in *Scribner's Monthly Magazine*, wherein domestic lighting, heating, and power were temperately discussed. In the current number of the same magazine there is a contribution of somewhat different character, dealing with the Edison electric light. This communication appeals to public notice on the ground of special authorization by Mr. Edison himself, who, in a brief note prefixed to the article, states that it is the first correct and authoritative account of his invention which has been published. The writer of the article, moreover, is Mr. Francis R. Upton, who is described as Mr. Edison's mathematician—a qualification which should be borne in mind when the merits of his communication are weighed. At the outset, then, we may fairly consider that we are treading on firm ground in criticizing the statements before us, and that the plea of incorrectness and unauthenticity, which has so frequently been urged on Mr. Edison's behalf, when any newspaper accounts of his progress in perfecting his system of electric lighting have been examined by incredulous critics, cannot in this instance be made available. At the same time we may express some surprise that the first authoritative account of such an epoch-making discovery as Mr. Edison's is claimed to be, should have been penned by any subordinate worker in the Menlo Park establishment, and further that, under his name, it should be confided to the columns of a popular magazine, where it claims the attention of readers in company with articles on bicycling and Sunday-schools. But we must take things as they are, and leave Mr. Edison to be the best judge of what befits his own dignity, and that of his labours.

It is stated at the commencement of the article that "the crowning discovery of Mr. Edison—the electric light for domestic use—is at last a scientific and practical success." And the means by which this end is achieved are generally described in terms equally terse and comprehensive: "A small glass globe from which the air has been exhausted, two platinum wires, a bit of charred paper, and we have the lamp. The generator of the electricity is simpler than a gas-generator, and the wires for its distribution are more manageable than are gas-mains and pipes. The light is equal to gas in brightness, and whiter in colour; it is enclosed, and, consequently, perfectly steady; it gives off no appreciable heat; it consumes no oxygen; it yields up no noxious gases, and, finally, it costs less than gas. The difficulty of subdivision Mr. Edison has also overcome. In his method of illumination, a number of separate lights can now be supplied from the same wire, and each one, being independent, can be lighted or extinguished without affecting those near it." Such are the general results claimed by Mr. Edison himself; whether he can make his claim good before all the world is another matter.

We may notice that the lamp itself is precisely the same as that described in previous reports of Mr. Edison's doings. We have the high vacuum glass, the fragile cardboard carbon, and the platinum connections. Everything hangs on the efficiency and durability of the piece of charred paper, which is so delicate that it looks like fine wire. The horseshoe shape is declared to have been adopted in order to approximate its appearance, when incandescent, to that of an ordinary gas-flame, and to secure the advantages of considerable area in the lighting body. Reference is made to the difficulty experienced with the earlier lamps, of the glass cracking round the wires, and admitting air, to the destruction of the paper; but this is stated to have been surmounted in the later specimens. No further drawbacks are admitted, the whole thing being considered to be perfect.

The generator, entitled "Faradic" by Mr. Edison, presumably to show that he is quite willing to allow that there were great men before Agamemnon, consists of an armature of wood covered with iron wire, upon which are longitudinal loops of insulated copper wire terminating in exposed blocks of copper acting as the commutator, from which the currents generated when the armature is rapidly revolved by steam or other power between the poles of an enormous electro-magnet, are taken off by copper brushes, and conducted to the main wire. "It is proposed to mass a large number of such machines [illustration given], and have them all pump electricity up from one wire into a second. The two large wires, held on supports above the floor, are intended, the one to carry the electricity away; and the other to bring it back after it has been used." We must submit this remarkably lucid description as it appears in the original. Comment on it is clearly unnecessary. To proceed: "It is proposed to establish such stations, in the course of a few months, in the heart of several of our large cities. These will supply houses for quite a distance [*sic*] round them. One thousand horse power is thought to be a sufficient amount for a unit, and the stations will be at such distance from one another that each district will require about this amount. The engines will be divided into four groups of 250-horse power each, with a spare one in each station of the same power." The vague way in which engines of 250-horse power in groups of five, with their appurtenances of boilers, houses, and the not insignificant establishment arrangements connected therewith, are "thought" to supply a line of wire innocently described as "quite a distance," is somewhat remarkable in this passage.

The wires are to be laid in bundles under the edges of the side walks, for ease of access. There would not be any need to put them beyond the reach of frost, for "the colder the wires are the less is the waste of electricity, thus giving a decided advantage over gas in winter, when most light is needed." This paragraph is about as vague as the last quoted, or else betrays a certain confusion of ideas, which, in a mathematician, is deplorable. One would have thought that leakage, or waste, must be as objectionable in summer as in winter. Waste is waste all the year round, and a gas-works would be in a curious position if, by reason of the leakage from the mains, there were a difficulty in maintaining the supply during the winter.

We are not told how much average waste of electricity must be expected, or even "thought of."

The system of measurement devised by Mr. Edison, whereby the consumption of electricity—we are forced to speak of it as a substance after Mr. Upton's "pumps"—in any house may be measured, is next fully explained. That it is ingenious is only what might have been expected; but that the plan of charging for the light by the foot, as for gas, and determining the quantity by the deposition of copper on a plate, will satisfy the suspicious mind of the householder, to whom the comparatively baby-task of reading a gas-meter is a profound mystery, we do not for an instant believe.

Domestic power, for the turning of sewing-machines, lathes, and other appliances, up to several horse power, is to be readily available from the same source and at the same expense as the light. Mr. Edison's dynamometer is also described, but the results arrived at as to the power of his Faradic generators are not stated; and then the article ends in the true "Hail, Columbia!" vein, slight displays of which, as a matter of course, occur throughout.

Now we have gone through the whole statement, stamped as it is with Mr. Edison's approval, what does it all amount to? Practically nothing that was not known before, and nothing whereby any judgment may be formed respecting the value of the invention from a commercial point of view, however ingenious it may appear as the work of a highly original and laborious experimenter in physical science. There is not a single datum of cost, power, or dimensions (except the remarkable one of the 1000-horse power unit) given in the whole communication. The cost of the lamp is said to be "trifling," the power of the generator is "immense," and the distribution is "simple;" but nothing that one can lay hold of, and submit to close examination and comparison, is afforded. This circumstance becomes all the more striking when it is remembered that it is a mathematician who writes the article—a man whose daily study must consist of those very facts and data which he withholds in this, the *first* official utterance to which an expectant world is treated. He begins his statement in a manner as strictly orthodox as a problem of Euclid—the proposition first, and then the construction; but the proof is altogether wanting. We cannot follow his remarks, descriptive and incidental, and rise from their perusal with a Q.E.F. on our lips. Perhaps the demonstration is to follow, although the peroration is as grand as if the writer felt it to be his last effort; but it would have been better if some signs of willingness to satisfy curiosity in this respect had been shown in the article itself.

The uncertainty which still prevails as to the practical fitness and durability of the vacuum lamp itself, the soul of the system, admitted as it undoubtedly is by some of Mr. Edison's warmest partisans, is not so much as brought forward for removal by Mr. Upton in this article. Perhaps the drawback of the liability to leakage, and consequent destruction of the necessary vacuum—referred to by *The Times* Philadelphia correspondent, in a letter, dated Jan. 20, which appeared in last Wednesday's issue of that paper—has sprung up in a fresh form since the article was written, as it is stated to have been discovered only within the past fortnight—that is, the second and third weeks of the present year. But, if this is the case, it shows how little reliance can be placed upon the sanguine prophecies of the writer of the article. In all probability, if the question of the importance of this, the most recent obstacle to the immediate establishment of Mr. Edison's system beyond the region of Menlo Park, were submitted to the inventor himself, or to his mathematician, it would be dismissed in the customary airy fashion, as being unworthy of more than a passing remark; but its practical bearing on the money value of shares in the Edison Light Company is shown by their having fallen from 3500 dols. to 1500 dols. per share. There may be no sufficient reason for this tremendous drop, as there was no solid consideration to warrant the former premium at which the shares were held; but there again we get the impression that the public generally have a right to facts as they are, and not merely to Mr. Edison's anticipations of what the future may have in store—if things go on precisely as he wishes and expects.

Scarcely any man in the present century, apart from the ranks of political celebrities, has enjoyed a greater notoriety than Mr. Edison, and this effect appears to have been produced by the efforts of others rather than by his own seeking; yet it would seem as though he had become not altogether unwilling to take advantage of the prestige which has long attached to his name, when we find his *imprimatur* on a series of astounding statements, the bearing of which on the private finances of all nations is fully admitted, and yet whose basis of fact is evidently intended to be supplied by his assertions alone. Wherever and whenever published, Mr. Edison certainly owed the public the privilege of drawing conclusions for themselves from authenticated facts. If his conclusions are well founded, the data on which they are based could well have been expressed in a very few sentences by Mr. Upton or any one else. If there is any doubt in the matter, a true philosopher would give the world the benefit of it, or have kept his proceedings to himself until it had been solved in one way or the other. Perhaps Mr. Edison means to come forward himself, at his own convenience, and publish a memoir that will completely establish his position, and strike his critics dumb. But, if such be his intention, why allow premature and incomplete disclosures to discount the interest which would otherwise centre in himself? The world will not always

> "stand at gaze,
> Like Joshua's moon in Ajalon,"

on Mr. Edison or any one else. The only way open for him to atone for the disturbance of the investment markets of the world, and the consequent disquietings of the minds of the legion who have invested their savings in gas property, which, however unintentionally, he has caused, is to justify it, and that can only be done by proof infinitely more conclusive than the mere *ipse dixit* which is all he has hitherto vouchsafed to all inquirers.

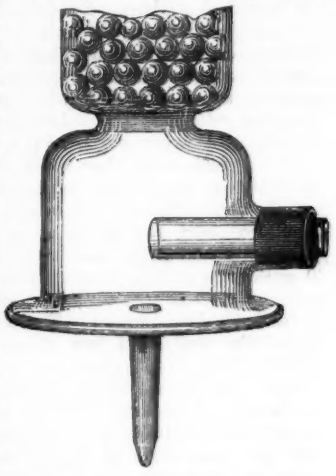
Communicated Articles.

NOTE ON THE GAS REFEREES SULPHUR TEST.

By Mr. H. Leicester Greville, F.C.S., &c., Chemist to the Commercial Gas Company.

It will probably have been noticed by all who have had much experience in the use of the Referees Sulphur Test, that the liquor obtained from the combustion of a fixed quantity of gas is somewhat variable in amount. I have frequently observed that, without any great fluctuation of temperature, the liquid obtained would vary by as much as 1½ ounces, and that different apparatuses would give different quantities of liquor.

An accidental occurrence placed me, a short time back, in possession of a fact which explains that which had previously puzzled me. A sulphur apparatus which had been recently set to work gave more than usual fluctuations in the amount of liquor which it yielded, and I had also reason to suspect that the sulphur indications were not so high as they should have been. I satisfied myself that no leakage existed, and had, therefore, to look to some other cause for these variations. I eventually noticed that the ammonium carbonate remaining after the test was complete, seemed to have suffered abnormal diminution in bulk, and felt moist when handled. I also noticed at the same time that there were marks on the trumpet tube, such as would be produced by drops of liquid trickling down the inside of the glass. It then occurred to me that part of the liquid combustion product which condensed in the cylinder and outlet tube was finding its way into the tubulure of the cylinder, and then running down the trumpet tube on to the ammonium carbonate surrounding the burner. This surmise proved correct, and as the initial cause in my apparatus was that the tubulure was so fixed to the cylinder that its extremity bent *slightly downwards*, I selected a piece of glass tubing slightly smaller in its external diameter than the inside of the tubulure, and about 2½ inches in length. By slipping a piece of rubber tubing over the glass tube, I was enabled to insert it in the tubulure, making a tight joint. The tube was so arranged that one end was level with the opening of the tubulure, while the other end projected into the sulphur cylinder. The accompanying sketch will illustrate the method used. Any liquid condensing in the cylinder and trickling down the sides could not, therefore, possibly get into the tubulure.



I find now that the quantity of liquid which I obtain is fairly regular, and its total amount is larger than the average yield generally obtained from the test.

Since adopting this modification, the amount of liquor in ounces obtained from the combustion of 10 feet of gas on nine successive days has been as follows:—8½, 8½, 8¾, 9, 8¾. 9, 8¼, 8½, 8¾; showing an extreme variation of only ½ ounce, and a mean quantity of (nearly) 8¾ ounces. The sulphur determinations have also been very satisfactory.

I believe that the variations in the amount of liquid produced by different apparatuses, and even in some cases by the same apparatus, are in great part explained by the fact which I have pointed out. Of course the behaviour of the apparatus in this particular detail would be dependent on the position, shape, and inclination of the tubulure, and there are no doubt in use many apparatuses which allow of no escape of liquid. On the other hand, there may be many in which the converse is the case, and inaccurate results are obtained. I therefore think it would be a good plan if the tubulure and trumpet tube were so proportioned in size that the end of the latter would slide into the former for a distance of about 2 inches, as this arrangement would ensure more accuracy than is obtainable under the present system.

Should any of your readers be using sulphur tests which yield a less quantity of liquid than is given by mine, and think it worth while to try my idea, I shall be glad to hear of the results.

THE CORROSION OF IRON.

By Mr. William Foster, M.A. (Cantab.), F.C.S., &c.,
Professor of Chemistry at the Middlesex Hospital.

Fifth Article.

I have now to consider some of the substances employed by engineers for protecting the surface of iron gasholders from corrosion. It is not an easy matter to classify the various bodies which are and have been used for this purpose. For instance, it has been proposed to coat the iron with metallic zinc (galvanize it), to cover it with its own oxide (Barff's process), or to apply a thin layer of Portland cement (Crease's process), as recommended by Mr. Douglas, in his paper published in the report of the proceedings at the meeting of

the British Association of Gas Managers at Newcastle-on-Tyne, in June, 1879. Now, each of these three substances—zinc, black oxide of iron, and cement—and the principle involved in its application, differs from the other two, and all three again differ very considerably from an ordinary protective varnish or paint. Varnishes and paints hold a prominent position, in consequence of the facility with which they can be applied; and I will, therefore, consider them first, and in doing so I shall follow, with a slight modification, the classification adopted by Mr. Douglas in the paper above referred to, because it is a simple and comprehensive one.

Firstly, with reference to varnishes. I think it will simplify their description if they are divided into three classes. A varnish is usually a compound of two or more substances, mixed in such proportions that the whole has a suitable consistency. When applied and exposed to atmospheric influences, a hard and uniform skin is formed. The covering thus produced may be the result of the evaporation of the volatile components, the basis having been originally dissolved by the spirituous component. For instance, if india-rubber (caoutchouc) be dissolved in bisulphide of carbon, and the liquid applied as a varnish, the volatile component readily evaporates on exposure to air, leaving a uniform coating of hard india-rubber. Atmospheric oxygen contributes nothing to the result. Such a varnish illustrates those comprised in the first class.

If ordinary or boiled linseed oil be applied as a varnish, the whole eventually forms a hard coating, but the result obtained in this instance is due to the formation of a solid oxidation product in which atmospheric oxygen plays a necessary and important part. Linseed oil is, therefore, an example of the second class of varnishes.

In the practical application of varnishes of ordinary composition both these processes co-operate. The volatile or spirituous component of the varnish evaporates, whilst another component of the varnish undergoes oxidation, producing a solid substance which is incorporated with the solid basis of the original varnish. The media employed for grinding up metallic oxides, in order to prepare a paint, behave in this way. They, therefore, may be taken as examples of the third class.

The most useful and interesting example of the first class is coal tar. Its method of production is too familiar to my readers to require any description. We may consider it as pitch dissolved and suspended in other substances which can be dissipated at moderate artificial temperatures. Pitch almost entirely consists of hydrocarbon compounds, the amount of oxidized resinous material present being small and of a very stable character—a fact one is prepared for when the high temperature to which the pitch has been subjected is considered. A hydrocarbon compound is wholly composed of carbon and hydrogen. Naphthaline (C_{10} H_8) is a familiar example. The hydrocarbon compounds in pitch and coal tar are, speaking generally, of a very stable type. They are practically unaffected by atmospheric oxygen and the presence of water at ordinary temperatures. Some, such as the paraffins, are of an exceptionally permanent character, requiring the strongest chemical agencies to bring about the formation of new substances. The paraffins are known in the gaseous, liquid, and solid state; but those having the first of these three characters are absent in coal tar, and therefore in pitch. There is comparatively nothing known by chemists respecting the individual components of pitch. Many of the more volatile constituents of coal tar are thoroughly well understood. I need but mention naphthaline (C_{10} H_8), anthracene (C_{14} H_{10}), benzene (C_6 H_6), and carbolic acid (C_6 H_6 O) to show the character and importance of some of these. And the character of the components of pitch, whatever they may be, is but of a more permanent order than that of many of the substances just named. When coal tar is used as a preservative of iron gasholders, it should be employed in a hot state. The reason for this is twofold. Firstly, the tar more thoroughly permeates the interstices of the wrought iron; and, secondly, the volatile constituents of the tar are more readily got rid of, leaving an even surface of pitch. This, as a varnish, has many excellent qualities. It resists the action of atmospheric oxygen, and the gases found in a gasworks. It is also proof against the influence of moisture, since it is incapable of forming hydrated compounds when immersed in water. But it has one great defect—it tends to flow like a liquid. It is a matter of common observation that when a lump of pitch is placed on a level surface, it slowly extends itself, unless adequately supported by lateral pressure. The substance is what the physicist terms "viscous." The weight of its own particles causes them to slide slowly over each other, under the circumstances, and take up new positions. This tendency to assume the fluid character is augmented by increase of temperature. Hence, when an iron gasholder has been coated with tar, and the operation is in other respects successful, the pitch gradually tends to "run," and form elongated drops or streams, presenting an appearance "which, to the eye of the anxious gas manager, is disgusting." The removal of the pitch from its original position exposes the iron at points to the usual corroding influences. This important defect which pitch possesses places coal tar at a great disadvantage, especially in a hot climate. At home it forms a most efficient varnish, particularly for submerged ironwork, provided it be properly applied. Coal tar, therefore, is the type of a durable, and in some respects efficient varnish. Were we able to prepare a form of pitch devoid of the viscous character, but having the other attributes of ordinary pitch, we should then have realized our ideal of what the basis of a varnish should be. I am not aware that any special attempts have been made to render pitch more useful. Natural forms have been used for purposes such as we are now considering, and it is just possible that some of these may have less of the fluid character than artificial pitch. When dissolved in the more volatile components of coal tar, the natural kinds furnish compounds analogous in many respects to the latter.

The defect which pitch as a basis for a preservative varnish presents is in a great measure avoided by the employment of caoutchouc. This substance is obtained from the milky juice which exudes from the lacerated stems of several tropical trees and arboraceous plants. In the natural state (ordinary india-rubber) it is a mixture of at least two hydrocarbons containing the same relative proportions of carbon and hydrogen. It is also noteworthy that these proportions are the same as obtain in rectified oil of turpentine ($C_{10}H_{16}$). Caoutchouc is not viscous, and therefore can be employed in high atmospheric temperatures. It also forms a hard, continuous surface when in spirituous solution and applied to iron surfaces as a varnish. But it has imperfections of such a character that, when employed alone as a basis for a preservative varnish, the result is a coating inferior to that formed by coal tar in its general use. This coating is prone to be affected by natural influences in a curious way. For instance, *in the dark*, atmospheric oxygen and water exert comparatively little influence on it, but in daylight it is very seriously altered by these agents. Oxidation and hydration products are formed, rendering the surface of the caoutchouc glutinous. Hence, disregarding the question of cost, caoutchouc, as a basis for a preservative varnish, is lower in the scale of general efficiency than pitch.

It is particularly interesting to know that Mallet's experiments and writings of 1839-41 demonstrated that, though caoutchouc varnish might be used with advantage in special cases, coal tar heated and applied to the iron in a hot condition was at that time the most efficient preservative of wrought-iron plates when the latter had to be exposed to air and saline solutions in a warm climate. His views were strongly in favour of the use of a mixture of naphthaline, paraffin, and asphaltum (pitch) in combination with mineral peroxides—that is the highest of the oxides, not of an acid character, furnished by the combination of a given metal and oxygen. Clearly his idea was to use hydrocarbons of such a character and in such proportions that the mixture would need some additional substance as a body. He regarded the mineral peroxides most favourably, since the metal present has already combined with as much oxygen as it possibly can under all ordinary circumstances, and therefore cannot be further affected by atmospheric oxygen. The hydrocarbons he mentions are some of those I have named, and are characterized by great stability. In principle the suggestions are excellent, but I fear that, if carried out in the way they are given, the defect of coal tar, so proverbially well known, would not be obviated. Suppose ferric oxide to be used in combination with coal tar, the whole being applied to the iron in a hot condition. Would the resulting pitch be devoid of a viscous nature? Not unless a relatively large quantity of the oxide were used, which in practice would be found objectionable.

A few months ago there was a brief account in several daily and other papers of some experiments made abroad on the value of euphorbium resin as a basis for a preservative varnish for iron. So far as the experiments had gone, the material had served its purpose admirably, but they had not extended over a sufficiently long period to establish its merits, and, of course, its defects. Euphorbium resin is obtained by evaporation of the milky juice which exudes from the punctured stems of various species of euphorbia—tropical arboraceous plants. As found in the markets, euphorbium resin is a mixture, in variable proportions, of at least three different resins, with wax, caoutchouc, organic salts, and water. By treatment with spirituous solvents, the resins, wax, and caoutchouc can be dissolved, and the solution employed as a varnish in the ordinary way. Two of the resins have been partially studied and are said to be of a stable and neutral character—that is, they are devoid of acid or basic properties. But one of the resins is of an acid character forming salts with alkalies. Such a substance is an element of weakness in the varnish. The behaviour of caoutchouc in this instance need not be discussed. Among other things it imparts the needed tenacity to the resinous bodies. So far, therefore, as our knowledge of the chemistry of euphorbium resin extends, it is obvious that its crude condition is not well adapted for the purpose we are now considering. The compounds most desirable as the basis of a varnish are the stable indifferent resins and caoutchouc. If these can be readily and economically removed from the crude substance, there are strong grounds for believing that the varnish prepared with such a basis would be of excellent quality, but not superior to coal tar in its general use as a preservative of iron. At the present time, euphorbium resin is almost entirely confined to the uses of the veterinary surgeon. He employs it as an important ingredient in vesicating plasters, instead of the more expensive cantharides. The price of the resin is such as will not seriously interfere with its use for the purpose of varnish making, should it be desirable to employ it in consequence of confirmation of the good accounts given of it a few months ago.

(To be continued.)

Forthcoming Exhibitions of Gas Apparatus.—Among the projected exhibitions of gas apparatus during the coming spring will be one at St. Helen's, on Wednesday, Thursday, and Friday, the 10th, 11th, and 12th prox.; a second at Ipswich during the week ending the 3rd of April; and a third at Leicester from the 12th to the 17th of the same month.

Sale of Shares in the Wakefield Gas Company.—Last Friday there were sold by auction in the town a number of shares in the Wakefield Gaslight Company. The competition for them was unusually keen, and we believe the prices realized were in advance of the amounts previously paid for similar shares. The following were the results:—

Five	£25 shares,	fully paid,	realized	£59 5s. each.
Twenty-two	5	"	"	12 15s. "
Eighteen	5 "B"	"	"	9 0s. "

The first two sets of shares are at present receiving, under the sliding scale, 11 per cent. dividend; and the "B" shares, £8 5s. per cent.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

FROZEN LAMP SERVICES.

SIR,—Much has already been written about the above, and numerous remedies have been suggested. I will therefore be brief. My experience is that the bend at the bottom of the horizontal part of the service-pipe is the cause of all the mischief. It is at this point that a stoppage, under ordinary circumstances, occurs, and when a severe frost takes place, the condensation from the horizontal pipe meets with an obstruction, and is in consequence more readily frozen. I think gas managers will find, as a rule, that the services most affected have been laid some considerable time, and are consequently more or less in a foul condition when John Frost makes his appearance. I have never had any difficulty in getting rid of our troublesome visitor, as I have always found a small quantity of naphtha poured into the pipes a sure remedy.

J. R.

Feb. 4, 1880.

A Gas Manager in the Principality writes that his district, being an elevated one, they are greatly troubled every severe winter through the public lamps being extinguished by frost—30 to 40 lamps per night is with them a common experience. Their remedy is a very cheap, simple, and easily-applied one, and it *never fails*. They make a strong solution of common table salt and water, and pour a little of it down the ½-inch vertical pipe, with the result that in a short time the lamp can be re-lighted. This method has been efficacious with them for more than 20 years past.

[In Mr. Pepy's letter in last week's JOURNAL, the sentence beginning in the fourteenth line from the bottom of page 165 should have read, "On being discharged into the public mains in the evening, it is not cooled down any farther, because the ground at a depth of 2½ to 3 feet only freezes after several weeks of intense cold."—ED. J. G. L.]

Parliamentary Intelligence.

HOUSE OF COMMONS.

THURSDAY, FEB. 5.

THE GOVERNMENT AND THE METROPOLITAN WATER SUPPLY.

In the course of the debate on the Queen's Speech,

Sir CHARLES DILKE said that the Metropolitan Water Supply Bill was not mentioned in the speech, but he hoped the Government intended to go on with it, and that an assurance to this effect would be given in the course of the evening.

Mr. FAWCETT also asked whether it was true that the Government intended, as had been recently reported, to carry out the promise, or perhaps he should say the wish expressed last session that they would introduce a measure dealing with the Water Supply of London. He would further like to know in what form and upon what day the matter would be dealt with.

Mr. CROSS, in reply, said: As to the Metropolitan Water Supply question, at the close of last session I promised to consider the subject, and see whether anything could be done to render the supply of water to London better than it has been hitherto—that is to say, that there should be a better supply of water, and, if possible, that it should be under one head, by which, without doubt, a very great saving would be effected. I have had several communications on the subject with the Water Companies; but I am not prepared at the present moment to state the result of those negotiations. I hope, however, to do so at the end of a week, or ten days at the outside, and to submit a Bill which will, I trust, receive the approval of the House. The proper course now, under the circumstances, as no notice has been given, would be that it should be a public and not a private Bill. The bargain, however, had to be arranged between the Water Companies on the one hand and the water consumers on the other; and I do not think any Government ought to be called on to make such a bargain. The Government, however, will be ready to submit the bargain to Parliament, after which the Bill will go before a Committee, where the whole case will be argued out. I hope this proposal will receive the sanction and approval of the honourable members.

Legal Intelligence.

YORKSHIRE WINTER ASSIZES—WEST RIDING DIVISION.

LEEDS, WEDNESDAY, FEB. 4.

(Before Justice LUSH *and a Special Jury.)*

STANSFIELD *v.* THE YEADON AND GUISELEY GAS COMPANY.

This was an action by Colonel Stansfield, of Esholt Hall, to recover a penalty of £200 from the defendants for a violation of the provisions of the Public Health Act by the pollution of the Yeadon Beck; and also damages for injury caused by such pollution. At the end of May last year the defendants, wishing to enlarge their gasholder, had to empty the tank; and to do this they laid a syphon-pipe from the holder to the stream, and they also began pumping the water into the stream. The work went on for a fortnight or three weeks, 750,000 gallons of water being emptied into the beck. The beck passes through the plaintiff's garden, and during the time the holder was being emptied the smell of gas was so unbearable that all the windows in plaintiff's house had to be kept closed. The facts were scarcely in dispute between the parties, but there were several points of law raised, the chief of which was whether the plaintiff was entitled to sue for the penalty as the owner of the beck. The plaintiff admitted that the sewage and drainage of Yeadon and Guiseley flowed into the beck, and that in warm weather the stench close to it was almost unbearable.

Mr. WILLS, Q.C., and Mr. LOCKWOOD appeared for the plaintiff; Mr. KAY, Q.C., and Mr. FORBES for the defendants.

Justice LUSH told the jury that they must take it to have been a wrongful act on the part of the defendants to pour the water from the tank into the stream, for they had no right to make even a foul stream more foul.

The Jury gave a verdict for the plaintiff, and assessed the damages at £100.

Justice LUSH said he would not give judgment for the £100 until the question as to the penalty had been decided, as there might be a further question whether the plaintiff was entitled to both the damages and the penalty.

LAMBETH COUNTY COURT.—THURSDAY, FEB. 5.

(Before Mr. J. H. PITT-TAYLOR, *Judge.)*

BARROW *v.* THE SOUTH METROPOLITAN GAS COMPANY.

This was an action to recover £19, alleged to be an excess on certain gas bills, and expenses incurred in testing a meter.

Mr. WASHINGTON appeared for the plaintiff; and Mr. LOWE for the defendants.

Mr. WASHINGTON, in opening the case, said his client occupied a 14-roomed house at East Dulwich, and was supplied with gas by the defendant Company. Prior to January, 1878, he had a 20-light wet meter supplied by the Company, but after that time he had a dry meter put up at his own expense; and, although his gas bills up to that time averaged about £10 13s. per year, when the dry meter was substituted the charges kept on increasing gradually until they accumulated to over £19 odd. The meter had been tested by a gas-meter inspector, who found that the Company had charged for more gas than the meter registered. The meter was taken to pieces in the presence of skilled witnesses, and it was found to register correctly, and an inspection of the index showed that 100,000 feet of gas had been charged in excess.

Mr. *James Barrow*, the plaintiff, confirmed the foregoing statement, and said that in the summer of 1878 he complained to the Company, and they sent their Mr. Schomberg to him, who said the inspector had read the index wrongly, and that he had been overcharged. Having occasion to make another complaint, Mr. Schomberg called again, and said there must be something the matter with the meter. It was taken down by one of the Company's servants, and was duly tested and certified to be correct. On one occasion when the inspector was taking the register, he (witness) pointed out to him that he was putting down 100,000 feet too much, and the inspector replied, "Then there must be something wrong with the hands."

Mr. *George Dethridge*, one of the meter inspectors appointed by the Metropolitan Board of Works, said when the meter was brought to him to test he read the index at 97,800 feet, but the Company's man who brought the meter said it was 197,800 feet. The meter was afterwards tested in the presence of several witnesses, and found to be correct.

Mr. *Earl* said that he put up the new meter, leaving all the hands at zero. He saw it when it was taken away to be tested, and it registered 97,800 feet.

Mr. TAYLOR asked where the million hand was.

Witness: Between zero and the figure 1.

Mr. TAYLOR said, if that were so, the register would be 500,000 feet. It was evident the witness was talking of what he knew nothing about.

Another witness gave evidence that he was engaged for ten minutes in turning the index hand round to make it register a million, so as to be sure that nothing was the matter with the works.

Mr. TAYLOR said the feat said to have occupied ten minutes could not have been accomplished in as many days. He could not see the necessity for Mr. Washington struggling further with the case, because no reliance could be placed upon such evidence as that given by the last two witnesses. He could readily understand how the plaintiff had been misled in reading the index, and, believing that the plaintiff had been simply charged for the gas consumed or wasted by him, he should give judgment for the defendants, with costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board last Friday, the Parliamentary Committee presented a report in regard to the Bills affecting the Metropolis which it is proposed to introduce in the present session of Parliament.

In the course of it, they say: "In the case of the Bill relating to The Gaslight and Coke, the Commercial, and the South Metropolitan Gas Companies, which has been deposited by the Corporation of London, and which has been before the Board on two or three occasions, your Committee are of opinion that a petition should be presented to the effect that legislation relating to districts outside the City, and under the jurisdiction of the Board, should not be initiated by the Corporation, and that the clause proposing that the Board should pay part of the expenses of the Bill should be struck out."

This recommendation was agreed to.

In reference to the South Metropolitan Company's Bill, the report states: "By the Bill of the South Metropolitan Gas Company power is sought to acquire land in Greenwich Marshes for the construction of additional works, to raise £1,000,000 of additional capital, and to borrow a further amount. Your Committee recommend that a petition be presented against this Bill, and that the question be raised of the necessity for acquiring the ground, raising the additional capital, &c.; and that the requisite alteration of the testing and forfeiture clauses of the Company's Act of 1876 be asked for."

Mr. RICHARDSON moved the adoption of this part of the report.

Mr. ROGERS moved as an amendment—"That the petition do also contain an allegation that the present initial price of 3s. 6d. is too high, and should be reduced."

This amendment was agreed to.

The report continued: "The Phœnix Gas Company applies for power to acquire the same land in Greenwich Marshes as is referred to in the South Metropolitan Company's Bill; to raise £1,000,000 additional capital, and to borrow a further amount. The Company also seeks power to amalgamate its undertaking with that of any other Gas Company within the Metropolitan area on the south side of the Thames, except the Crystal Palace Gas Company. This power should be subject to some limitation. Clauses are inserted in the Bill to bring the Company under the same conditions as regards price, dividends, lighting power, purity, and pressure of gas, as those in The Gaslight and Coke Company's Act of 1876. Your Committee are of opinion that the standard price of 3s. 9d. per 1000 feet proposed to be fixed should be reduced, seeing that 3s. 6d. is the price allowed to the South Metropolitan Company. They recommend that a petition to this effect be presented, that objection be made to the power of amalgamation asked for, and that the question of the necessity for the additional land and increased capital be also raised."

This recommendation was at once agreed to.

As to the London Company's Bill the report says: "The Bill of the London Gaslight Company is somewhat similar to that introduced by the same Company last year. Power is sought by the Company to sell or let to the consumers of gas in its district apparatus of various kinds for the use of gas for other purposes than lighting. The Committee do not propose that the Board should offer any objection to the principle of the Bill, but they recommend that a petition be presented asking that the Company's expenditure of capital for the purposes named in the Bill may be limited to £25,000."

Mr. RICHARDSON proposed the adoption of this recommendation.

Mr. JOHN JONES moved as an amendment—"That the Board specially

oppose the action of the London Gas Company to add the sale of gas-stoves to its present duties."

The amendment was not, however, seconded; and the motion, on being put, was passed.

The only other paragraph in the report in reference to Gas Bills was the following:—"The Wandsworth and Putney Gas Company seeks power to raise further share capital to the amount of £120,000, and to borrow £30,000, the dividend on the share capital to be at the rate of 7 per cent. This Company is not one of those to which the provisions of the Metropolis Gas Act of 1860 apply. Your Committee recommend that a petition be presented, asking that the Company may be made subject to similar provisions as to sliding scale of price and dividend, disposal of new shares by auction, and other matters, as have already been applied to other Companies; and also that any new buildings to be erected by the Company may be governed by the provisions of the Metropolis Local Management and Building Acts."

This proposal was likewise agreed to.

THE AVERAGE METER SYSTEM IN KENSINGTON.—At the meeting of the Kensington Vestry last Wednesday, the Gas Lighting Committee reported that The Gaslight and Coke Company have agreed to reduce the proportion of metered lamps in the parish from 1 in 20 to 1 in 24. The Committee therefore recommended that 40 meters be at once taken out of calculation. This was agreed to.

METROPOLIS WATER SUPPLY.

THE SOUTHWARK AND VAUXHALL WATER COMPANY'S BILL.—The Parliamentary Committee of the Metropolitan Board of Works presented a report at the meeting of the Board last Friday, in the course of which they say, in reference to the above-named Bill: "By the Southwark and Vauxhall Water-Works Company's Bill power is sought to amalgamate the Company's undertaking with those of other Water Companies in the Metropolis, subject to the consent of the Board of Trade. It appears to your Committee that it would be better that any proposal for amalgamation should be brought before Parliament in a Bill, instead of being dealt with by the Board of Trade. The Company proposes to construct an additional pumping-station, reservoirs, and other works, and to raise £600,000 of additional share capital. The necessity for this should be fully shown, and, if the new capital be authorized, provision should be made for its issue by public tender or auction, in accordance with the precedent which was laid down by Parliament in the year 1878 in the case of the Grand Junction Company. It might also be well to ask for conditions securing an adequate and constant supply of water under sufficient pressure. Your Committee recommend that a petition raising the points above mentioned be presented against the Bill." Mr. Richardson moved the adoption of the recommendation, and this was agreed to.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Thursday, the 29th ult.—the Rev. Dr. PHELPS in the chair—when the Directors presented their report on the working of the Company during the past six months. It recommended that a dividend for the half year of 10 per cent. per annum on the consolidated stock, and of 7 per cent. per annum on the paid-up shares, and on the amount called up during the past half year on the new shares, be paid, free of income-tax.

The Manager (Mr. J. Weeks), in his half-yearly report, stated that the new works had been so far completed as to admit of their being used to meet the still increasing demand for gas. The older parts of the works had been kept in as good a state of repair as possible; but the time had now arrived, he said, when their renewal must receive the serious consideration of the Directors. The illuminating power, pressure, and purity of the gas had, with a slight exception, been kept up to the required standard.

On the motion of the CHAIRMAN, seconded by Mr. SWAN, the reports and balance-sheet were adopted.

The CHAIRMAN proposed that the dividends recommended in the Directors report be declared.

Mr. E. COLLIER seconded the proposition, and it was carried unanimously.

The Rev. A. T. CRISFORD then proposed a vote of thanks to the Chairman for his conduct in the chair, and to the Directors for the general way in which they conducted the business of the Company.

This resolution having been seconded and carried unanimously, the meeting ended.

CAMBRIDGE UNIVERSITY AND TOWN WATER-WORKS COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, Jan. 30—Mr. ELLIOT SMITH in the chair—when the following report was presented:—

The Directors recommend that a dividend on the consolidated stock, and the first and second calls on the £2 shares for the half year, and on the third call upon the £2 shares for the quarter ending Jan. 6, 1880, at the rate of 10 per cent. per annum, be paid, free of income-tax. After paying this dividend, there will be a balance of £22 4s. to be carried to the next account, thus reducing the previous balance by £115 14s. 11d.

The Directors refer the Shareholders to the Engineer and Manager's report, which shows the progress of the Company's business.

The 148 unallotted £2 shares were disposed of by public auction in October last, and realized the sum of £692, being a premium of £396. This amount, less the expenses of sale, has been carried to the suspense account. These shares will not receive dividend up to Jan. 6, 1880.

The mortgage of £7500 upon the Company's works was paid off on the 15th of October last, and, in order to effect this, the sum of £5000 was temporarily borrowed of the Company's bankers. The payment of the amounts due on the acceptance of the new shares recently issued has enabled the Directors, since Jan. 6, to repay £2500 of the temporary loan.

In accordance with the recommendation of the Directors in their last report, it will be proposed to convert the £2 shares into consolidated stock.

The retiring Directors are the Rev. Dr. Okes and the Rev. Dr. Perowne, who are eligible for re-election.

The Engineer and Manager (Mr. H. Tomlison) reported as follows:—

During the past half year, water from the Company's works has been laid on to 230 premises, the increased rental derivable from which is £196 per annum. The total number of premises now supplied is 7667.

The work connected with fixing the new boiler at the Company's pumping-station is progressing satisfactorily, and will soon be complete.

The general condition of the Company's works continues satisfactory.

The CHAIRMAN said he thought it very gratifying that they were able to pay the dividend of 10 per cent. He proposed the adoption of the reports of the Directors and Engineer, and the balance-sheet.

Mr. WHITTING seconded the motion, which was agreed to.

The CHAIRMAN next proposed the payment of a dividend at the rate of 10 per cent. per annum.

Canon HOPKINS seconded the motion, which was carried.

Mr. DEATH proposed, Mr. CLAYTON seconded, and it was agreed that the £2 shares of the Company be converted and consolidated into capital stock.

The next business was to elect two Directors in place of the Provost of King's College and the Vice-Chancellor.

Canon HOPKINS thought they could not do better than re-elect the same gentlemen, who had served them so well in the past. He proposed the re-election of Dr. Okes, who joined the Directorate at the time that he (Canon Hopkins) was Chairman, in the early days of the Company. He congratulated them upon the position the Company had gained, and the good that it was doing for the poor, in providing them with an abundant supply of wholesome water at a cheap rate.

The motion was seconded by Mr. C. BALLS, and agreed to.

The MASTER of ST. CATHERINE'S proposed the re-election of Dr. Perowne as one of the Directors, and, in doing so, took the opportunity of referring to the value of the shares of the Company, which had been disposed of at a recent sale at £4 13s. premium, which was the largest price that had ever been realized.

The motion was seconded by Mr. E. FOSTER and adopted.

Dr. PEROWNE returned thanks for his re-election, and spoke in complimentary terms of the way in which business was conducted by the Directors, and promised to do his best to serve the interests of the Company.

Mr. CLAYTON proposed, and Mr. SWAN seconded, a vote of thanks to the Chairman, which was agreed to.

The proceedings then terminated.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday—Mr. EDWARD WINCH in the chair.

The SECRETARY (Mr. W. Syms) read the report of the Directors, which stated that the business of the Company for the past half year had been more favourable, the profits allowing of the writing off of a few items from the capital account in addition to paying the usual dividends. The new coal-store was about to be erected, and some other improvements made. The usual dividends at the rate of 10 per cent. per annum on the A and D shares, and of 7 per cent. on the B and C shares, were recommended. The statement of accounts showed a balance of profit on the half year, after all payments, of £3049.

The Rev. R. WHISTON moved, and Mr. W. P. HAYMEN seconded the motion for the adoption of the report, which was agreed to.

The CHAIRMAN proposed the payment of the dividends recommended in the report.

Mr. WHISTON seconded the motion, which was carried.

The retiring Director (Mr. J. Levy) was then re-elected; and Mr. W. Homan, who was formerly Auditor, was elected a Director in place of the late Mr. W. B. Black. Mr. W. P. Haymen was appointed Auditor, *vice* Mr. Homan.

A vote of thanks to the Directors, which was acknowledged by the Chairman, ended the proceedings.

EASTBOURNE GAS COMPANY.

A Special Meeting of this Company was held on Monday, the 2nd inst.—Dr. JEFFERY in the chair—for the purpose of considering and, if thought fit, of approving a Bill for conferring further powers on the Company for the purchase of land, the construction of works, the raising of money, and otherwise, in relation to their undertaking.

The SECRETARY (Mr. J. H. C. Coles) having read the notice of meeting,

The CHAIRMAN moved that the Bill be approved. In doing so he reminded the Shareholders that at the last meeting the Directors received their sanction to apply to Parliament for powers to increase the capital of the Company. They had since then, with the assistance of their Parliamentary Agents, their Engineer, and their Secretary, drawn up a Bill which had passed the Examiners of Standing Orders of the House of Commons. The Bill had been presented to the Local Board, and examined by that body, and the only objection they raised was that they wished for increased pressure in the supply of gas. The Directors, after due consideration, had, however, decided to let the Bill remain as it was, as they were of opinion that what was sufficient for London was sufficient for Eastbourne. The only other objection raised was to a clause in the Bill, which, if passed, would give them the power to sell or let on hire gas-fittings, engines, machinery, &c. A memorial had been received from the tradesmen of the town dealing in gas-fittings, &c., who wished to exclude this clause from the Bill. The Local Board, however, had decided not to oppose the Bill, and would not have anything to do with the memorial from the gas-fitters. He (the Chairman) could not see why there should be any objection to the Company supplying with gas-fittings, &c., those inhabitants of the town who asked them; and he might say they had no idea whatever of commencing a gigantic trade in these articles. The Bill, therefore, was an unopposed one, and opposition could only now come from one quarter. An opposition to the Bill meant putting it off for another year; while, at the present time, it would be promoted with a certainty of success. The Directors did what they thought best, not only for the Shareholders, but for the town at large. There was no wish on the part of the Company to monopolize the trade of the gas-fitters in Eastbourne; but they considered it would be to the advantage of the Company to have these powers, and if they obtained them it by no means followed that they would exercise them. The Bill had already, as he had said, passed the Examiners of Standing Orders, and no doubt Parliament would also pass it.

Mr. HILLMAN seconded the motion, and it was carried unanimously.

This was all the business of the meeting.

YORK UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday last—Mr. J. F. TAYLOR in the chair.

The SECRETARY and MANAGER (Mr. C. Sellers) read the notice of meeting and the following report on the Company's operations during the past six months:—

The profit upon the half year's revenue account amounts to £6142 9s. 5d. This sum, added to £53 8s. 6d., interest on money specially deposited at the Company's bankers, and £3 10s., balance of premium upon the unappropriated fractional parts of shares recently sold by auction, makes a net profit of £6199 7s. 11d. Out of this amount the Directors have carried £800 to the reserve-fund, and they now propose to apply the remainder to the payment of the usual dividend of 5s. per share upon the old shares of the Company, and 1s. per share, or 5 per cent. per annum, upon the new shares, the same to be paid free from income-tax. These payments will absorb £5379 17s. 6d., and leave £19 10s. 5d. to be carried forward.

In accordance with the Company's Act of Parliament, a resolution to confirm the forfeiture of 320 new shares, not appropriated in the recent allotment to the Shareholders, will be submitted to the meeting.

The two scrubbers referred to in the last report have been finished, and are now at work. The Directors also in their last report alluded to the remodelling of the remaining portion of the Company's retorts. This has been carried out, and now the whole of the carbonizing space upon the existing works is occupied, and will consequently necessitate the immediate commencement of the proposed new station. The piling of the new site has already been completed.

In anticipation of such commencement, the main from Layerthorpe across Foss Islands has been relaid with a pipe 15-inch diameter, and forward to the Barracks with a 12-inch.

To meet a generally expressed wish on the part of the public that the Company should have offices in the city, the Directors have recently purchased an eligible site for offices in Davygate, which, they think, from its central position, cannot fail to meet with public

approval. This purchase, coupled with the new trunk main and other items, has added considerably to the capital account.

The business of the Company is satisfactory, and the Directors regard its future growth with confidence.

[The total amount of capital authorized to be raised by the Company is—old shares, £100,000; new shares, £80,000. The total amount of loan capital authorized is £20,000, but no money under this head has yet been borrowed. The profit and loss (net revenue) account shows that the amount carried to the reserve-fund was £800, and the balance of net profits, subject to the payment of dividends, was £16,344 1s. 9d. The balance of net profit brought from the last account, after payment of dividend, was £10,944 13s. 10d. The reserve-fund of the Company now amounts to £6806 19s. 7d.]

REVENUE ACCOUNT, FOR THE HALF YEAR ENDED DEC. 31, 1879.

Expenditure.

To Manufacture of gas—			
Coals, including carriage and all expenses of depositing same on works	£7,878	6	0
Purifying materials	182	3	1
Salaries of Superintendents and Officers at works	266	11	5
Wages at works	1,480	14	6
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	780	12	7
	£10,588	7	7
Less materials sold	3	9	4
	£10,584	18	3
Distribution of gas—			
Salaries of Inspector, Assistant Inspectors, and Clerks in Light Office	270	19	10
Repair, maintenance, and renewal of mains and of service-pipes, including materials, laying and paving, and labour	495	1	3
Repairing, renewing, and refixing meters	324	8	4
Public lamps—			
Lighting and repairing	438	16	11
Rates and taxes	159	11	11
Management—			
Directors allowance	300	0	0
Salaries of Secretary, Accountant, and Clerks	288	17	5
Collectors salaries	140	0	0
Stationery and printing	84	16	6
General establishment charges and incidentals	226	6	1
Law	12	4	6
Bad debts	15	0	5
Carting	219	16	10
House property	1	12	1
New mains	25	3	9
Bankers charges	35	1	6
Sales returned	5	19	6
Discounts and abatements	6	17	11
Gas-fitting—			
Goods bought, salaries, and wages	1,866	6	8
Sales returned	44	17	6
Discounts and abatements	2	18	10
Bad debts	2	6	10
Total expenditure	£15,551	12	10
Balance carried to profit and loss account	6,142	9	5
	£21,694	2	3

Receipts.

By Sale of gas—			
Common gas (87,876,100 cubic feet), at 2s. 6d. per 1000 feet	£10,984	10	3
Public lighting and under contracts	1,616	5	4
	£12,600	15	7
Rental of meters	828	7	8
Residual products—			
Coke, less labour and cartage	3,126	16	1
Breeze " "	12	2	3
Tar " "	922	19	5
Ammoniacal liquor, less labour and cartage	879	9	5
Rents	103	13	4
Spent lime	153	13	11
Barrels	9	10	9
Ashes	22	19	1
New mains	25	3	9
Cartage	269	5	3
Breaking coke	123	12	9
Sundries	3	0	7
Amount received on account of bad debts	0	10	10
Interest received from bankers	52	0	9
Gas-fitting—			
Sales of fittings	2,538	13	8
Packages returned	16	7	2
Total receipts	£21,694	2	3

The CHAIRMAN, in moving the adoption of the report, said that during the last half year the consumption of gas had been steadily increasing, and coke was getting into better favour. Its use was becoming better understood, and the breaking machine they had in operation rendered it more applicable and more easy to be used for household purposes. He was sorry to say that public institutions were among the last to make use of coke, but it was hoped they would soon recognize its value as an article of fuel. As to the capital account, the first thing he had to mention was the outlay for the new mains which they had found it necessary to lay, to meet the requirements of the city, more especially in the rapidly increasing suburb of New Fulford and Fulford Road. They had taken up the small main they lately had across Foss Islands, and replaced it with a 15-inch main. They had now a 12-inch main up to the Barracks, and they thought this would be amply sufficient to meet, not only present, but any future requirements, and would give them every facility for supplying the gas required in the new streets that were being formed on the Fulford Road. With respect to property, the first mentioned in the report was a property in Layerthorpe. When the Company went to Parliament this property was scheduled, and, unfortunately, when property was put into the schedule of a Bill in Parliament, its value, in some people's eyes, seemed wonderfully magnified, and in this case the Directors were asked a price for it which they felt they were not justified in giving. They had not long to wait before the death of the proprietor brought the property into the market, and they purchased it, because it completed the square of the ground they bought previously from the Ecclesiastical Commissioners, and gave them a frontage of some considerable length to the Layerthorpe Road, which would be of great benefit when the new works were built. They thought they had done the Company good service by securing the property at a reasonable price. It had often been asked why they had not central offices in the city, and an opportunity occurring, they had purchased a valuable site in Davygate, which had an area of 1100 square yards, and a frontage of 93 feet to the street. It would afford every facility for offices, and perhaps a board-room; for show-rooms, fitting-shops, meter-shops, and, in fact, every convenience for carrying on the business of the fitting department connected with the Company—a business which they found to be increasing. The building would be central, but not too obtrusive on the city. The Foss Islands Railway having been opened, they had now relieved the streets of the carting of 25,000 tons of coal during the year. This must have been a great obstruction, leaving out of account the wear and tear of the streets. It was not all profit to the Company, however, because they had to pay an extra price to the Railway Company for delivering the coal at the new depôt on the Cattle Market side; still it was a matter of satisfaction to the Board to know that they had contributed so far to the comfort of the citizens by removing what must have been an annoyance. The confidence of the Directors in the soundness and prosperity of the Company was undiminished. The Company were in a flourishing condition, and the Shareholders might rest assured that if anything could be done to promote this efficiency and prosperity it would not be lost sight of. They had had many telegrams from across the Atlantic, which had caused uneasy Shareholders to flutter, but the last that had come announced that the pretensions of the hero of Menlo Park were a failure. He moved the adoption of the report.

The VICE-CHAIRMAN (the Lord Mayor) seconded the motion, and it was agreed to.

The CHAIRMAN said the Shareholders would see, from the balance-sheet, that the capital account of the Company showed a debit of something like £4380 on the 31st of December, but on the 1st of January a new call was received, which had put them into funds, and he thought they had something like £1000 in hand at the present time. When they sold the forfeited shares they hoped to raise another £1000, but before long they would want some more money, and they were prepared to tell the course they proposed to adopt. They had power under their Act of Parliament that when £20,000 of capital was raised they could borrow £5000. They might exercise those powers; but there would be no call till July, and perhaps not then. He then proposed that the 320 new shares not appropriated in the recent allotment to the Shareholders be forfeited and sold by the Directors, in accordance with the regulations of the Company's Act of Parliament.

This motion was carried; as was also a motion that a dividend of 5s. per share on the old shares, and 1s. on the new shares, without deduction for income-tax, be declared for the half year ending Dec. 31.

The Rev. C. H. WELLBELOVED proposed a vote of thanks to the Directors for the efficient manner in which they had conducted the business of the Company. He advocated the supplying of gas of good quality and at a reasonable price, so that its use for cooking and other purposes, for which the electric light was not available, might be encouraged.

Mr. FELTOE seconded the proposition, which was supported by Mr. J. R. HILL, and adopted.

The CHAIRMAN replied, and the meeting terminated.

YORK NEW WATER-WORKS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Thursday—Mr. J. F. TAYLOR in the chair.

The SOLICITOR (Mr. J. P. Wood) read the report of the Directors, which was as follows:—

The new works at Acomb Landing are practically completed, but the engines have not yet been actually delivered over to the Company by the contractors.

The Directors recommend that a dividend of 5s. per share on the preference shares, being at the rate of 5 per cent. per annum; a dividend of 8s. per share on the ordinary shares, being at the rate of 8 per cent. per annum; and a dividend of 5s. per share on the new shares, 1878, being at the rate of 5 per cent. per annum for the past half year, be declared, and that a dividend of 6d. per share on the new shares, 1879, from the 1st of October to the 31st of December last, being at the rate of 5 per cent. per annum, be also declared, and that the same respectively be paid without deduction for income-tax.

The following Directors—viz., Mr. Ralph Davison, Alderman Terry, and Mr. John Brown—retire by rotation, and are eligible for re-election. The retiring Auditor is Mr. Henry Sotheron, who is also eligible for re-election.

Messrs. T. and C. Hawksley, the Engineers of the Company, in their report said:—

We have the pleasure to state that the new pumping-engines at Acomb Landing have been in regular use since they were started on the 1st of August last, and continue to perform their duties very satisfactorily. Messrs. Hawks, Crawshaw, and Sons are now engaged in executing certain small rectifications before handing over the engines to the Company on the expiration of the term of maintenance prescribed in their contract.

The diversion of the Acomb Brook for the purpose of conveying the waters of that stream into the River Ouse, below the point at which the water for the supply of the city is taken, has been completed and brought into use, and the railway siding and coal shoots have also been constructed during the past half year. The extension works at Acomb Landing may now, therefore, be considered to have been satisfactorily finished.

[The financial statement showed that the receipts on construction account, up to Dec. 31, had been—Calls on 8000 ordinary shares of £10 each, £80,000; calls on 2000 £10 preference shares, £20,000; ditto on 2000 £10 shares (1878), £20,000; amount of first call of £2 per share on 2000 £10 shares (1879), £4000; loans on mortgage, £10,000—total, £134,000. The payments had been, up to June 30 last, £128,048 0s. 11d.; since that time the outlay included new works at Acomb Landing, £2498 11s. 2d.; new engines, £1326.19s.; new houses at Acomb Landing, £505 5s. 5d.; pipe-laying, £161 15s.; meters, £20 9s. 9d.; and other items of a miscellaneous character brought up the total to £132,540 8s. 11d., leaving a balance in hand of £1459 11s. 1d. The revenue account for the half year showed that water-rents had realized £6473 8s. 7d.; property-rents, £38 10s. 6d.; sales of plumbers fittings, £261 6s. 4d.; fittings on hand at the close of last year, £111 18s. 6d. The payments included salaries and wages, £364 7s. 6d.; wages at Acomb, £214 17s.; coals for engines, £323 6s. 6d; rates and taxes, £77 9s. 1d.; Directors, £325; repairs of engines, reservoirs, &c., £744 5s. 10d. After meeting other items of outlay, there remained a balance in hand of £7911 10s. 8d. available for the payment of dividend and for working capital.]

The CHAIRMAN, in moving the adoption of the report, said there had been some difficulty about the future rating of the Company's property at Acomb Landing, in consequence of the authorities of the Ouseburn Union having imposed a heavier charge than the Company thought they ought to pay; but he was glad to inform the Shareholders that the matter had now been satisfactorily arranged. Referring to the revenue account, he said that on comparing the balance-sheet with the corresponding one of 1878, it would be found that the water-rents had increased, though somewhat slowly. The Company had had great difficulties to contend with in consequence of the frost, which caused their pipes to burst, and stopped the supply by meter, from which they were deriving considerable revenue. From the same cause they had been put to additional cost in placing stand-pipes in the streets. So far as the capital account was concerned, it was felt that if ever there was a time when the Directors were called upon to use their best endeavours to maintain the efficiency of the Company, that time was the present. Referring to the new water-works, he said they were all aware that the outlay had been considerably more than was at first anticipated. Although this was so, and although the works put up might for the present be more than were required, they believed the right step had been taken. They had been looking forward to the future wants of the city, which would ultimately call into exercise and full operation all their powers of pumping up and delivering the water into the city. The works were of a very substantial character, and every modern improvement had been taken advantage of. This had called for a large increase of capital, which had been met, and they had made a profit on the half year. He intimated that on the 1st of April they would require a further call of £2 per share, with which they hoped to be able to discharge all the liabilities which they had undertaken. Whatever liabilities might come upon them afterwards would be duly considered, and laid before them.

The DEPUTY-CHAIRMAN (Mr. J. L. Foster) seconded the motion.

Mr. W. C. ANDERSON said the only thing he regretted was that they kept the dividend up so much, because they did not know what might

come upon them, and he thought it was the best way to have a large reserve-fund.

Mr. RYMER said the Directors were able to pay the present dividend, and carry forward a much larger balance than they did five or six years ago. They had, therefore, no reason to be anxious.

The CHAIRMAN said they thought when a dividend was justly earned, as the present had been, the Shareholders should receive it.

The report was then adopted.

On the motion of the CHAIRMAN, seconded by Mr. J. L. FOSTER, the recommendations in the report as to dividend were adopted.

The retiring Directors and Auditor having been re-elected,

Mr. RYMER proposed, and Mr. FELTOE seconded, a vote of thanks to the Directors for their services, which was passed.

The CHAIRMAN, in replying, said there was still some misapprehension existing in the minds of certain people respecting the breaking up of the streets, and he took this opportunity of explaining that when there was an accident in the trunk main they of course attended to it to prevent waste, and this was the only occasion on which the Company opened the streets, for the service-pipes were not the Company's property, but belonged to the householders, and if the Company opened the streets to repair such pipes they did it as the householders servants.

The proceedings then terminated.

WEARDALE AND SHILDON WATER-WORKS COMPANY.

The Annual Meeting of this Company was held on Wednesday last—Mr. H. PEASE, J. P., in the chair.

The report, which was taken as read, stated that the revenue for the past year was such as to leave a disposable balance of £11,444, out of which the Directors recommended a dividend at the rate of 3 per cent., in addition to the interim dividend of 3½ per cent. already paid; which would leave £314 to be carried to the credit of next year's account. The recent depression in trade caused a decrease in the revenue until November, since which time there had been a considerable improvement, which was expected to yield a large increase in revenue. The Durham Water Company were now amalgamated with the Company, the City of Durham being supplied with water from the Waskerley reservoirs of the Company. Extensions of the filtering-beds were needed, and were about to be proceeded with. The statement of accounts showed that during the past year £39,341 had been expended on capital account, and that the gross revenue of the Company had risen to £13,847.

The CHAIRMAN, in moving the adoption of the report, said that the water had now been laid on in the City of Durham from their reservoirs, and in about four weeks the pipes giving increased pressure would be carried on to Gillyate Moor and the neighbourhood of the Cathedral. The capital of the Company was £386,337, and there had been expended on the capital account during the year £39,000. The reservoir service of the Company now comprised 988 million gallons, of which 520 millions were at the Tunstall reservoir and 450 at the Waskerley, with 11 small service reservoirs containing 18 million gallons. The calculation of the Company's Engineer (Mr. Hawksley) was that there would be a supply of 2,750,000 gallons throughout the district, even in the driest season. The water was supplied to 16,081 houses—an increase of 411 during the year—but there had been as many as 2999 houses taken off in the pit district, and he was surprised to find that the number of pit houses at which the water was laid on up to the present time had not been greater. There was, however, a steady increase. It took some time after the men again obtained employment before they were prepared to take a supply of water from the Company. The decrease in rents compared with the previous year amounted to £516. They had, however, to take into account the increased demand for manufacturing, which had been larger by 3 million gallons in December and 4 millions in January. The future of the Company, therefore, gave greater promise.

Mr. J. BURDON seconded the motion, which was carried.

On the motion of Mr. STRINGER, seconded by Mr. DAVISON, Mr. E. Towns was re-elected Auditor.

Mr. BELL moved that a dividend of 7s. 6d. per share be declared, making, with the interim dividend declared and paid in August last, a dividend at the rate of 3¾ per cent. per annum for the year ending Dec. 31, 1879.

Mr. CARTER seconded this proposal, which was at once agreed to.

The CHAIRMAN proposed that Messrs. D. Dale, W. C. Stobart, and H. F. Pease be re-elected Directors of the Company; and that Messrs. W. Boyd and J. Rogerson be elected to fill the existing vacancies.

Mr. KAY seconded the motion, which was carried; and, after the usual votes of thanks, the meeting terminated.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Quarterly Meeting of the Birmingham Town Council was held last Tuesday—the MAYOR (Mr. R. Chamberlain) presiding—when a report from the Finance Committee was read, which recommended the levying of rates to the same amount as last year—4s. 3d. in the pound, being composed of borough rate, 2s. 1½d.; improvement rate, 2s. 1d.; and street improvement rate, ½d.

Mr. WILLIAMS, in moving that the Council should go into committee for the purpose of considering the borough estimates for the current year, said he thought the outlook for 1880 was hopeful. The municipal debt on Dec. 31, 1879, was £1,241,385, showing a net increase of debt for the year of £74,822. The gross increase was £120,000, in round numbers, but £45,000 of this had been paid for during the year in sinking-fund and repayment of loans. The debt of the Gas Committee was £2,263,157, showing scarcely any increase for the year 1879; the Committee did increase the debt, but they had since wiped off the increase. They last year placed to the credit of the sinking-fund no less an amount than £28,199, which, of course, had been derived out of the profit of the twelve months working.

The motion being agreed to, the Council went into committee to discuss the various estimates—among others, that of the Gas Committee, who estimated that for the year 1880 they would be able to pay £25,000 over to the borough rate.

On the motion for the approval of this estimate,

Mr. BEARD moved, as an amendment, that it be struck out. He said he was aware that if his amendment was carried it would necessitate the levying of rates equal to the amount proposed to be struck off, but he believed the course adopted by the Council was illegal, and not in harmony with the spirit of the Act of Parliament under which the gas-works were acquired. In the form in which the estimate stood it was a practical instruction to the Gas Committee to make a charge that would enable them to carry the £25,000 to the benefit of the rates, and this was not contemplated by the Act. The 36th section of the Act of 1875 set forth the way in which the surplus money should be appropriated. The clause was as follows:—

> The Corporation shall keep an account in respect of their gas undertaking separate from all their other accounts, and shall apply all money from time to time received by them in respect thereof (including any annual sum or sums payable in respect of the sale of any portion of the undertaking) except borrowed money, in the manner, and in the order following and not otherwise (that is to say):—(1) In payment of their costs, charges, and expenses of, and preliminary and incidental to the preparing for, obtaining, and passing of this Act; (2) in payment of the costs, charges, and expenses of the Corporation of, and incidental to the granting and issuing of annuities, mortgages, and debentures; (3) in payment of the working and establishment expenses, &c.; (4) in payment of the interest on annuities; (5) in payment of interest on mortgage loans, &c.; (6) in providing instalments on sinking-fund; (7) in payment of all other their expenses; (8) in providing a reserve-fund, if they think fit, by setting aside such money as they from time to time think reasonable, during the first ten years to £50,000, and after that to £100,000. And they shall from time to time carry to the borough improvement rate or fund the net surplus remaining after the fulfilment of the several purposes aforesaid.

He contended that to make an estimate of the income derived from the gas-works was not contemplated or provided for. He knew he should be told that it was simply a question of account, but he contended to the contrary, and said he was supported in his argument by Lord Chief Justice Cockburn and Justice Mellor, who distinctly said, in the case arising out of the award made in the arbitration between the Corporation and the West Bromwich Improvement Commissioners, that the Corporation were not constituted a trading authority by the Act, and that they had therefore no right to estimate that a profit would be made. They had no report or balance-sheet before them, and yet they were asked to treat the £25,000 as a net surplus. It practically meant that the Gas Committee were to levy a gas-tax until they had produced the estimated result. He would at least ask that counsel's opinion should be taken, for he was advised that the course taken by the Council as it now stood was thoroughly illegal.

Alderman AVERY, Chairman of the Gas Committee, said that Mr. Beard's argument was so singular as to carry with it its own condemnation. He said the estimate should not be agreed to without the statement of the gas accounts for the past year being in their possession. This was exactly what every other Committee of the Council was doing. There was not a single committee that had its accounts at present in the hands of the Council, but long experience taught the Gas Committee to anticipate with great accuracy what their expenditure would be, and there was seldom any wide discrepancy between the estimates made and the actual expenditure. Mr. Beard also said that the Gas Committee were encouraged to make some provision in the shape of £25,000 for the general borough fund and rates. He (Alderman Avery) hoped the Committee would long be encouraged to do so. The course taken by the Council was quite legal, as the words quoted by Mr. Beard himself proved, that the Committee "shall from time to time carry to the borough improvement rate or fund the net surplus remaining." What was net surplus but profit? If Mr. Beard chose to call it a surplus, he (Alderman Avery) had no objection whatever, but the effect was the same. Although it was not for him (Alderman Avery) to question the opinion of so high a legal authority as the Lord Chief Justice, still he said they were plainly told in the statute how the surplus was to be disposed of. The Corporation of Manchester in the year 1878 had contributed no less a sum than £53,000 towards the highway rate from the profits on the gas-works, and it was in the same way that the Birmingham Gas Committee proposed to deal with their surplus of £25,000. He denied that it was a charge on the gas consumers, and maintained that the amount was saved as the result of corporation management and saving, and the gas consumers participated equally in the benefit with the other ratepayers.

Alderman MANTON said he believed that no scheme had excited so much jealousy in the town as the success which had attended the acquisition of the gas undertakings. This success was due to Alderman Chamberlain, M.P., and there were some people who could never forgive him for their great success. He asked Mr. Beard whether he would recommend that the Gas Committee should not add any further sum to the guarantee-fund. He did not think he would, and Mr. Beard did not seem grateful for the £33,000 per annum that had been taken from the gas profits and given to the consumers. This point seemed to be overlooked. For himself, he did not consider that the proposed £25,000 handed over to the rates was at all too large an amount of interest upon a capital of £200,000. The gas was as cheap now as ever it had been.

Mr. BRINSLEY seconded the amendment; but at the same time said he thought, notwithstanding it was a very able one, it had better be withdrawn.

Mr. WILLIAMS said the most important part of Mr. Beard's speech was that relating to the Act of Parliament. He (Mr. Williams) often failed to understand what Mr. Beard contended for; but if he understood him rightly on the present occasion, he said that the estimate of £25,000 amounted to a demand upon the Gas Committee for the sum. He (Mr. Williams) denied this altogether. The way in which the estimates were framed was this: They sent to the Gas Committee, the same as they sent to every other committee, and asked for a statement of their accounts. It might be that the accounts would show a demand on the other side; but it happened invariably that they showed the wholesome sum of £25,000 on the right side. The Council made no demand upon the Gas Committee for it. It was the Committee's statement to the Council that they estimated to give them £25,000.

Alderman LLOYD said he did not agree with a previous speaker that they were getting gas as cheaply as they should have done if the Companies still existed in the town. He thought the Companies, who used the roads without charge, were able to supply gas unfairly cheap, and this was done in lieu of paying any rent. Was the sum of £25,000 a year an unreasonable sum, he asked, to draw from the Committee for the use of the streets and roads? He did not think it was. If profits on the gas-works to the extent of £60,000 or £80,000, instead of £25,000, were paid over to the rates, he thought Mr. Beard would have a strong case; but he maintained that £25,000 a year was not an unreasonable rent for the use of the roads.

Mr. MARRIS said the Gas Committee hoped to present their report at the next meeting of the Council, and he thought it would be advisable to defer criticism until then. As regarded the reduction in the price of gas, he pointed out that the Committee had reduced their income by rather more than £33,000, which amount was given to the consumers. He also reminded the Council that when the question of the price of coal was considered they should also take into their calculation the price of coke.

Mr. BEARD, in reply to Alderman Manton, said he had not objected to the sinking-fund or the reserve-fund, but to the transfer of £25,000 to the credit of the improvement rate. He objected to the mode of procedure, considering that it was illegal to employ the surplus profit in the way proposed. If they made an estimate, it followed that provision would be made to cover that estimate, and to make such provision was not in accordance with the Act of Parliament.

Alderman HEATON, alluding to the remarks of Alderman Lloyd, said he considered the large amount derived from the gas department ought to go to the public, and he hoped next year a considerable portion of the £25,000—say two-thirds or three-fourths—would be given to the Public Works Committee.

The amendment was then put and lost, and the estimate approved, there being only two dissentients—Messrs. Beard and Brinsley.

SALE OF SHARES IN THE YORK GAS COMPANY.—Last Wednesday £5 old shares in the York United Gas Company, entitled to 10 per cent. dividend, were sold, *ex div.*, at £10 13s.; and new shares, £3 paid, entitled to 5 per cent., at £3 3s., *ex div.*

MANCHESTER CORPORATION WATER SUPPLY.

The annual report and statement of accounts of the Manchester Corporation Water-Works Committee have just been issued. From them it appears there is an estimated excess of liabilities over assets on revenue account, for the twelve months ending Dec. 31, 1879, of £5306. This has arisen from the fact that, consequent upon bad trade, water supplied for trading purposes through meters decreased, in the quantity used, to the extent of 105 million gallons during the year. The amount of estimated available rates outstanding on the 31st of December last, out of a gross sum of £59,702 10s. 7d., was £104 15s. 1d., and of rentals £107 9s. 5d., out of a gross sum of £137,231 16s. 4d.

The testing and stamping of water-fittings continued to progress satisfactorily. During the past year 43,113 water-fittings were examined and tested, of which 40,474 were passed and stamped; and on subsequent inspection such fittings successfully stood the pressure of the water. The expenses attending the stamping office had, as in previous years, been entirely defrayed by the fees received. During the year the internal water-fittings in 32,478 houses, warehouses, and other premises were inspected, and waste therein prevented, where necessary, by putting the fittings into proper repair, in accordance with the regulations of the Committee. There had been 6412 cases of inspection of rates and 6660 cases of rentals had been examined by the Inspector and his assistants in the course of the year, and such cases had been subsequently dealt with by the Sale and Supply Sub-Committee.

During the year 9¼ miles and 214 yards of new iron piping were laid in place of old piping on renewals account. Upwards of 12 miles of iron piping had also been laid, in extensions, in various townships during the year, and the Committee had made connections to 3492 additional houses and other premises, by means of upwards of 4½ miles of lead piping, at an expense of £1141 7s. 3d.

The Longdendale reservoirs had, with one exception, been maintained in good condition. The exception was in the case of the Torside reservoir, respecting which the Water Committee reported: "In the spring of the year the leakage on the Cheshire side, which is usually clear, became a little turbid, pointing to some defect in the puddle lining. As soon as circumstances would allow, the water in the reservoir was gradually drawn off, and at a level of about 64 feet below top water a breach in the lining beyond the embankment was discovered. No time was lost in making the necessary repairs. These were completed in September. The work remained uncovered by water till the end of November, when the water was raised about 20 feet over the site of the repair, and everything appeared to be sound. The extraordinary flood of Dec. 31 raised the water to within about 15 feet of top water level, when the leakage water again appeared unsatisfactory. The water in the reservoir is therefore being withdrawn to the level of the defective part, when repairs required will be at once made, so that the reservoir may be available for this year. The 24-inch syphon-pipe at the embankment, by which water can be drawn off at 26 feet and 41 feet below top water, has been laid, the valves fixed, and all completed except the fixing of the winding gear and the laying of a few pipes on the outer slope, which work is now in hand."

On the subject of the Denton extensions, the Committee say: "The road diversions are finished, and all matters with the Contractors settled. The reservoir works have also made fair progress during the year. The severe weather of this and the last winter and the unusually wet summer have materially impeded the works. The brickwork is nearly completed. The quantity of earthwork and puddle placed in the embankments is about 1,440,000 cubic yards, out of a total quantity of 1,700,000 cubic yards. The stone pitching now done is about 16,000 cubic yards, out of a total quantity of 140,000 cubic yards. The total value of work done to the present time amounts to about £196,595, out of a total of £276,000."

At the Quarterly Meeting of the City Council last Wednesday—the Mayor (Alderman Patteson) presiding—the Water Committee recommended that a public water-rate of 3d. in the pound, and a domestic water-rate of 9d. in the pound, should be made and levied on all property assessed thereto, for the purpose of raising the amount required for payment of the expenses connected with the supply of water within the city during the year commencing on Jan. 1, 1880. This it was reckoned would produce £54,170 0s. 7d.

Institution of Civil Engineers.—At the meeting of the Institution last Tuesday—Mr. W. H. Barlow, F.R.S., President, in the chair—the monthly ballot resulted in the election of Professor Tyndall, F.R.S., as an Honorary Member; and, among others, of Mr. John Orwell Phillips, Chief Officer of the Chartered Gas Company, as an Associate.

Epping Gas Company, Limited.—The annual meeting of this Company was held on Monday, the 2nd inst., when the report of the Directors, on the operations of the Company during the past year, was presented. They recommended the payment of a dividend at the rate of 5 per cent. per annum; and stated that the debt on loan account had been so far reduced as to render its entire extinction practicable within a short period. The accounts showed a balance in hand, on profit and loss account, of £409 11s. 4d.—the receipts during the twelve months having been £1077 19s. 6d., against disbursements of £668 8s. 2d. The capital and loans of the Company amount to £5830; and the estimated value of the works, plant, land, &c. (after due allowance for depreciation), is £5749. We may state that the Company was formed in 1862, but till within the last few years scarcely paid any dividend. Since then the management of the undertaking has been under the care of Mr. Walter Tweed, the Secretary, who has quite resuscitated the property, so that the £10 fully paid-up shares, which in 1875 could be bought for less than £8, are now rarely purchaseable at £12. The whole of the plant, too, is in such good working order that it is anticipated the Directors will be in a position, this time next year, to recommend a dividend of 7 per cent., besides setting something aside for a reserve-fund.

The Price of Gas at Birkenhead.—At the quarterly meeting of the Birkenhead Town Council last Wednesday, Captain Hatfield, pursuant to notice, moved—"That in consideration of there being a large accumulation of profits to the credit of the gas and water account, the Gas and Water Committee be instructed to consider what reduction can be conveniently made in the present price of gas, and that the reduction be made accordingly." He pointed out that the price of gas was at present higher in Birkenhead than in Liverpool, and urged that it was the duty of the Corporation to offer every possible advantage to those who could be induced to come and live at Birkenhead. Mr. Laird seconded the motion, saying it was desirable that the Committee should look into the matter and furnish any necessary explanation with regard to the accumulated profits. Mr. Rawcliffe said that a large quantity of land had been purchased and temporarily paid for out of the surplus profits in the hands of the Committee; and, as steps were in contemplation with a view to the improvement of the water supply, he thought it undesirable for the Council to resolve at present upon any reduction. Mr. Willmer also opposed the passing of the resolution. Finally the motion was carried in an amended form, the question of a reduction of price being referred to the Committee, with instructions to report.

THE ALLEGED DESTRUCTION OF LEATHER BOOKBINDINGS BY GAS.

At the last annual meeting of the American Association for the Advancement of Science, a paper, "On the Deterioration of Library Bindings," was read by Professor W. Ripley Nichols, of the Massachusetts Institute of Technology. It dealt with the vexed question as to whether or not the combustion of coal gas has any deleterious influence upon the leather employed in the bindings of books. The paper was as follows:—

Some time since a librarian of my acquaintance brought to me the backs of a number of books, the leather of which had, in some instances, deteriorated to such an extent as to readily crumble to a brown powder when scratched lightly, as with a finger-nail. My opinion was asked as to the part that coal gas or the products of its combustion played in the destruction of the leather. I confess that I had supposed the matter settled long since, having in memory a discussion in the English journals some ten years ago. When I found, however, that a chemist as eminent as Dr. Wolcott Gibbs doubted the influence of coal gas in the matter, I felt that there was room for further investigation. Although I have not done as yet all that I should like to do, or indeed all that I expect to do in the matter, I desire to state the results which I have obtained, in the hope that there may be others here who can throw some light upon the subject.

I may first recall what has been done by others. As long ago as 1854, Dr. Letheby made a report to the City Authorities of London,* in which he took the ground, which he afterwards on other occasions maintained, that the destruction of bindings in libraries, and the destruction of textile fabrics in warehouses, where gas was burned continuously and in large quantities, was due to the products of the combustion of imperfectly purified gas. He noticed that the water produced by burning gas is always acid, and will rot leather, paper, cotton, and linen.

Dr. Odling, in a lecture before the British Association of Gas Managers, June, 1868,† maintains that the amount of sulphur in coal gas is of no great consequence, and shows by mathematical calculation that the amount of sulphuric acid formed is extremely small compared with the amount of air through which it is diffused. In spite of this, every chemist knows that sulphuric acid is formed when coal gas is burned, and that articles of galvanized iron or of zinc, when exposed to the lamp-flame, become corroded with formation of sulphate of zinc. This fact is noted with some quantitative statements by Mr. Charles Heisch, F.C.S., Superintending Gas Examiner to the Corporation of the City of London.‡ From a burner consuming ½-foot per hour, the products of combustion of which passed into a zinc chimney, he collected in six weeks ¾ lb. of sulphate of zinc.

In the *Chemical News* for 1877, Vol. XXVI., p. 179,§ Professor A. H. Church states that he found in decayed leather from the backs of books which had been on the upper shelves of an apartment lighted by gas—

Free sulphuric acid	6·21 per cent.
Combined „	2·21 „

He accepts without hesitation the theory that the decay is due to the sulphuric acid formed by the combustion of the gas. In the same volume of the *Chemical News*‖ there is a paper on the subject by Mr. George E. Davis, who examined the leather of some books which had been in daily use in a large office in Manchester from 1855 to 1858. After that time till August, 1877, they remained uncovered on a shelf near the ceiling of the same room. The books had been strongly bound in rough calf, and had red basil lettering-pieces. Upon knocking the books the leather of the backs came off as a mixture of dust and small pieces, which was very acid to test-paper. The leather from the back was treated with water, and the aqueous solution found to contain by weight of leather taken—

Combined sulphuric acid	2·84 per cent.
Free „ „	1·92 „

The leather underneath the lettering-piece contained—

Combined sulphuric acid	0·39 per cent.
Free „ „	0·76 „

The red basil lettering-piece contained—

Ammonia	1·28 per cent.
Combined sulphuric acid	0·87 „
Free „ „	1·04 „

In 1878, Dr. Gibbs examined books in the Boston Public Library, in the Boston Athenæum, in the Harvard College Library, and in the Astor Library in New York City, in some of which gas is used, and in others not. He arrived at the conclusion "that there was no sufficient evidence" that the products of the combustion of coal gas caused the trouble, and seemed inclined to consider the fault to lie in the tanning of the leather. He says: "I analyzed a number of samples of the leather in my own laboratory, and found no free acid whatever."

My own experience is as follows:—I have had a large number of samples of leather in all stages of decay. I found, as others have done, that *morocco* is but little affected, while Russia and calf are badly acted upon, and ordinary sheep is also attacked. Qualitative and quantitative examinations showed that, in a general way, the more the leather was decayed the more marked was the acid taste and acid reaction on test-papers, and the larger was the amount of sulphuric acid to be found in the aqueous extract. Further, I found that the aqueous extract always contained ammonia, and although the solution had an acid reaction, and required a certain quantity of alkali to neutralize it, in no instance, I think, was the acid in greater quantity than that which would be required for the *acid* sulphate of ammonium. I examined a number of samples of fresh leather; the aqueous extracts were only slightly acid, not sufficiently so to affect the taste, and contained only a minute amount of sulphuric acid in combination.

I will now give some of the results of quantitative analyses which have been made in my laboratory. The method employed was to soak the leather with successive portions of water until chloride of barium ceased to produce a precipitate, using at first, at any rate, a temperature less than that at which the leather balls together. A portion of the extract was acidulated with chlorhydric acid, and the sulphuric acid precipitated as sulphate of barium. Another portion was distilled with carbonate of sodium, and the ammonia determined by the Nessler reagent. The results were calculated into percentages of the original leather. Under this treatment samples of new leather of good quality gave the following results:—

	Sulphuric Acid (SO_3).	Ammonia (NH_3).
Uncoloured Russia . .	0·25 per cent. . .	0·14 per cent.
Coloured Russia . . .	0·42 „ . .	0·21 „
Sheep, oak-tanned . .	0·21 „ . .	0·08 „

A sample of *well-worn* but not *decayed* sheep was taken from the side of a family Bible, printed in 1814, and presumably in the original binding.

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* See Journal, Vol. III., p. 367.
† *Ibid.*, Vol. XVII., p. 523, *et seq.*
‡ *Ibid.*, Vol. XXIV., p. 856.
§ *Ibid.*, Vol. XXX., p. 649. ‖ *Ibid.*, p. 884.

The book had never been exposed to gas. The leather was found to contain—

Total sulphuric acid.	1·42 per cent.

A sample of very rotten Russia, which was very strongly acid to taste and to test paper, contained:—

Total sulphuric acid.	8·4 per cent.

Another lot, scraped from a number of books, contained—

Total sulphuric acid.	10·6 per cent.
Ammonia	3·1 ,,

In this case the "acidity" of the extract was determined. The greater part of the acidity was due to the presence of sulphuric acid, either "free" or as an "acid salt." Reckoned as sulphuric acid, it amounted to 4·2 per cent.

Another sample contained—

Total sulphuric acid.	6·4 per cent.
Free or an "acid salt"	2·4 ,,
Ammonia	2·4 ,,
Lime	0·1 ,,
Alumina.	No more than a trace.

These determinations indicated to me that the sulphuric acid was in considerable measure present as sulphate or acid sulphate of ammonium. I then performed the following experiment:—

A quantity—about 20 grams—of the rotten leather was carefully extracted with water, and after dialyzing the extract several times, and allowing the dialyzed liquid to crystallize, I obtained about a gram of white crystals which were but slightly acid to test-liquids, and were found to contain—

Sulphuric acid (SO_3)	56·43 per cent.
Ammonia	23·20 ,,
Non-volatile matter	10·23 ,,

The non-volatile matter contained something insoluble in chlorhydric acid, also some lime and an amount of sulphuric acid equivalent to 4·01 per cent. of the original crystals. Leaving out this sulphuric acid which remained in the "ash," the composition of the portion driven off by heat would be—

Sulphuric acid (SO_3)	58·39 per cent.
Ammonia	25·84 ,,
Water and loss	15·77 ,,
	100·00

The theory for the normal sulphate of ammonium is—

Sulphuric acid (SO_3)	60·60 per cent.
Ammonia	25·76 ,,
Water	13·64 ,,
	100·00

It would seem, therefore, that in this case the crystalline salt obtained was mainly the normal sulphate of ammonium. In other cases, however, the impure crystals obtained evidently contained some of the acid salt.

In view of these facts, it would certainly seem that bindings of Russia, calf, or sheep, when exposed to the products of the combustion of illuminating gas, do absorb sulphuric acid. It is difficult otherwise to account for the large amount—8 and 10 per cent.—which is found in the rotten leather. A small amount might come from sulphate of lime in the leather, from sulphate of iron used in staining the backs, and from other sources, but the amount in the samples of new leather which I have examined is very small, and the largest amount that I have ever found, except where I knew the leather had been exposed to gas, was in the sides of a dilapidated copy of Athanasius Kircher's "*Magneticum Naturæ Regnum.*" The history of the binding was unknown, as well as its age; it was very "greasy," and from it water took out 4·9 per cent. of sulphuric acid. It was somewhat acid to taste, but it is not unlikely that the book had, in the course of its long history, been exposed to sulphurous acid from the combustion of soft coal, or indeed to gas itself. The same leather contained 2·2 per cent. of ammonia, but this could easily be accounted for. As in other cases, more or less ammonia may come from the air, from the decay of the paste, from the leather itself, and some, no doubt, from the gas in certain cases.

With reference to the source of the sulphuric acid, it has been objected that the sulphur compounds burn mainly to *sulphurous* acid, and not to *sulphuric*. I analyzed some of the deposit which formed on a galvanized iron plate which received the water condensed on the under surface of a "water-bath" when the gas was first lighted. I found the salts present to be a *sulphate*, and could obtain no evidence of a *sulphite*.

As it has been suggested that the alum in the paste might explain the sulphuric acid, I took some of the scraped backs and examined a portion containing the paste and paper of the back as well as some leather. The results were—

Total sulphuric acid	3·55 per cent.
Alumina (with trace of iron) only . . .	0·42 ,,

It has further been suggested that it is the fault of the leather. I cannot prove that this is not so, and as a part of the investigation I desire to examine some decayed backs which have never been exposed to gas. This I have not been able to do. Although I have been promised such backs, I have never received them. I may say in this connection that some of the books which I have examined were bound by a man now engaged in the same library, and he claims to know that the leather was good when put on.

I think the evidence collected throws such suspicion on the gas burned, that one would be justified in insisting upon better ventilation, and in recommending that the burners should be arranged, when practicable, so that the products of combustion should be drawn by a ventilating chimney or pipe away from each burner, without mixing with the air of the room. In one of the London libraries, referred to by Dr. Letheby, better ventilation was determined upon, and, as I understand it, with gratifying results.

To settle finally the vexed question, I have laid out the following plan:—I propose to have a set of books bound at the same time by the same person, using the same leather and paste. These books are, some of them, to be put in the most exposed situation, one of them to be carefully examined now, one after a year's interval, another after two years, and so on. Meanwhile two of the same set are to be put where they will not be exposed to gas, but where they will quietly grow old. I believe this, coupled with an examination of the air, which I hope to make, will settle the question.

It should be said that the books which are most decayed have been upon the upper shelves of the library, where they are subjected to a high temperature, and it is, of course, *possible* that the disintegration of the leather has given an opportunity for the absorption of the vapour of sulphuric acid and ammonia rather than that the absorption is the cause of the disintegration.

ANNUAL SOIRÉE OF EMPLOYÉS AT THE PAISLEY CORPORATION GAS-WORKS.

The *employés* at the Paisley Corporation Gas-Works, together with their wives and friends, held their third annual *soirée* last Friday night. Mr. George R. Hislop, Engineer and Manager, occupied the chair, and was supported by a number of the Gas Commissioners and other gentlemen. After tea,

The Chairman delivered an interesting address, in the course of which he said that, as the programme showed, this was their third annual *soirée*, and he assured the strangers present that *soirées* promoted by the *employés* of gas-works were considered rather a favourable sign. The fact not only indicated friendly feeling and sympathy with one another, but also showed the condition of things in the manufacture and distribution of gas. Hence it was that up to the year 1876 such a meeting as this was almost impossible. When practicable, however, he held that such meetings resulted in considerable good; they tended to unite the workers together in friendly feelings and associations. Some workmen were distinguished by the name of the "Black Squad;" but those whom he addressed had the somewhat exalted title of "Sons of Light." He considered that in the whole range of human industry there was no class of workmen upon whom a larger portion of the happiness and comfort of the community depended than on the *employés* of gas-works; and whether they might esteem it a privilege or not, Parliament had recognized the importance of their services, by passing an Act to punish every "Son of Light" who deserted the service, or was guilty of a breach of etiquette or good order by becoming a "striker." He need scarcely tell them, as workmen, that on the carefulness with which they discharged their daily duties, and, above all, on the economy they exercised in apparent trifles, would depend the quality and cheapness of the gas supplied to the community. He subsequently went on to speak of the electric light, remarking that he was sure that gas light, like truth, must prevail. The electric light had failed to accomplish a great many things that the light with which the audience were concerned, and with which they were all familiar, had accomplished. When the electric light was brought prominently forward about two and a half years ago, it seemed to threaten to render gas lighting one of the things of the past; but he was bound to say that gas lighting would not be such, so long as they had an abundant supply of coals, and it would not take place as long as they could sell cannel gas at 8s. 4d. per 1000 cubic feet; and their price at Paisley just now was 3s. 9d. per 1000 feet. Mr. Edison might live to justify his conduct and obtain his blessing, but he (the Chairman) was sure that he would get the very reverse of that from a large number of gas shareholders, who were frightened from the holding of valuable gas stock in order to save another calamity such as befell the unfortunate shareholders of the Glasgow Bank. Gas was really now so much appreciated as a means of illuminating and for cooking and heating purposes, that they could scarcely conceive how the rival light could be brought forward to supersede it. That being the case, in the face of the extraordinary advantages derived from gas, it would be a difficult matter indeed for the electric light or any other light to supersede coal gas. Therefore, he held that gas stock investment was the most valuable of the present day. The price of gas in America ranged from 5s. to 13s. per 1000 cubic feet, and the illuminating power was only one-half that of Paisley or any other Scotch gas, and they were not at all alarmed or apprehensive of the competition of the electric light. This being so, English and Scotch people might be perfectly calm, and let no electric shock or fearful dreams disturb their rest.

Bailie M'Gown, Convener of the Gas Committee, subsequently addressed the meeting. He said he thought they had done a wise thing in calling upon their respected Manager, Mr. Hislop, to preside at the *soirée*. It was more especially encouraging to see this, because it was really their own *soirée*, as they had taken it in hand and managed it themselves. The progress of the various Trusts of the Corporation had, as they knew, been very great, but none had shown greater progress than the Gas Trust. It had occurred to him one day to look up what was the extent of the Gas Trust at its commencement, and he was astonished to find that the income for the first year of its existence was only £1850, whereas last year it was £26,600. This, of course, was the growth of 56 years—as it was so long ago as that since Paisley was first lighted with gas. Paisley was early amongst the towns to adopt gas lighting, and he believed it would be another long time before gas would cease to be used there or at any place where it was now employed. He reminded the audience that the year which had passed since their last meeting had not been uneventful even in the history of the Paisley Gas Trust. During the year one of the most successful exhibitions of gas apparatus ever held in the United Kingdom was held in Paisley. He did not speak from his own knowledge of the exhibition, although he had seen it again and again, and had been delighted with it; he spoke from the testimony of those who had taken care to attend many exhibitions, and they had never attended one more successful than that held in Paisley. This was attributable very much to the skill and care of their excellent Manager.

Addresses were also delivered during the evening by Mr. Dobie, Bailie Clark, and Ex-Bailie Fisher.

THE WATER SUPPLY OF PARIS.

For some considerable time past the Municipal Council of Paris have had under consideration the subject of the water supply of the city, with regard alike to quantity, quality, and price. This question, which is of so much importance to the public health, has been much deliberated upon, in the desire to procure for the inhabitants of the city a supply of water at once pure and abundant. As the result of the Council's labours, and of the large sums of money they have voted for the purpose, it is believed that in the course of the next three or four years the Parisians will have at their disposal, for domestic purposes, on every floor of their houses, a supply of excellent spring or river water, drawn from the high reservoirs already constructed at Montrouge and Ménilmontant, or from those hereafter to be constructed in other parts of the city; while for industrial purposes, or for gardens and stables, an ample supply will be available from the Canal de l'Ourcq.

The present system of water supply is the subject of much complaint on the part of the consumers, and the Municipality have been urged to take action in the matter. And here it may be well to state shortly what is the position of the Municipal Council and the consumers with regard to the private Company who supply Paris with water. Previous to the year 1859 there was no intervening body between the City Authorities and the consumers. The former fixed the price to be paid for the water they sold, and their servants were authorized to tap the mains to lay on the services to the houses. In the communes immediately contiguous to the city the water supply was in the hands of the General Water Company, consisting of several small Local Companies amalgamated into one. The then Prefect of the Seine—M. Haussmann—brought forward a scheme for establishing a kind of partnership between the City and the Water Company. The terms were accepted by the Municipal Commission, a treaty was entered into on the 11th of July, 1860, was adopted by the State Council on the 27th of the following September, and was finally sanctioned by Imperial decree on the 2nd of October. Various alterations

were made in this treaty in 1867 and 1869, among them being one of very considerable importance, inasmuch as it secured to the Water Company the management of the water supply of the city till the 1st of January, 1911. One article (Art. 27), however, anticipated the possibility of the City Authorities, for certain reasons which the Company were not at liberty to inquire into, considering it expedient to take the administration of the water affairs out of the hands of interested parties, and the conditions under which this change was to be effected were defined. The treaty of Dec. 29th, 1869, was one of the last acts of the Haussmann administration.

By virtue of these treaties, therefore, the position of the Water Company in relation to the City appears to have been this: The City to pay to the Company for the entire term of the treaty an annuity of 1,160,000 frs. (£46,400), as compensation for the cession of the sale of water in the various communes, and of the lands, buildings, pipes, reservoirs, and materials of every kind in their possession, lying within the fortifications. The Company, however, have the entire control of the water placed at their disposal by the City; and they also have to arrange with consumers for giving them a supply of water, which has to be charged for according to a tariff annexed to the treaty, and this tariff having been agreed to by both the contracting parties, it cannot be altered without their mutual consent.

The 14th and 15th articles of the treaty of July, 1860, were not altered by the treaty of 1869. In these it was stipulated that all work in connection with the water service between the main and the stopcock should be done under the supervision, and by the agents and servants of the Municipality, but at the Company's expense; the Company, however, were to continue the work from this point into the houses, and were to properly reinstate the pavements, and make good any damage they might cause. It must not be supposed, from the tenor of these articles, that the expenses here referred to would continue to be borne by the Company, for by an agreement made in February, 1860, between the Engineer-in-Chief of the Water Service and the Superintendent of the Company, and confirmed by the Prefect of the Seine in the November following, it was stipulated that the cost of these works should be borne by the consumers, who were also to pay for keeping the water-pipes in repair, according to a scale of charges annexed to the original treaty; these words being added: "The water shall be delivered as soon as the account for the work done at the expense of the consumer shall have been paid." By Article 18 the Company were authorized to receive all moneys, and each week they were to pay them into the Municipal exchequer.

By the treaty of 1860 the expenses of managing the water supply were fixed at 350,000 frs. (£14,000), the Company being allowed, by way of premium, 25 per cent. on the amount of the receipts above 3,600,000 frs. (£144,000). The treaty of Dec. 27, 1867, however, abolished these administrative expenses, and in lieu thereof gave the Company 25 per cent. on the amount received beyond the sum above specified, up to and including 6,000,000 frs. (£240,000); above this sum, and up to 9,000,000 frs. (£360,000), 20 per cent.; from 10,000,000 frs. to 11,000,000 frs. (£400,000 to £440,000), 15 per cent.; 12,000,000 frs. (£480,000), 10 per cent.; and above that amount, 5 per cent.

We now come to the question of the price to be paid for the water, and to the charge to be made by the Company for work done by them on behalf of the consumers. The mode of supplying the water was to be determined by the Company according to the circumstances of the case; but one of the following methods was to be employed:—(1) The water to be turned on for a given time, and the inflow to be regulated by a gauge-cock, of which the Company's servants alone were to have the key. Under this arrangement the water was to be delivered into a cistern placed at a height to be determined by the Company's servants. (2) By a supply direct from the main. (3) By estimate, and without measurement. (4) By meter. The mode of supply most suitable for the ordinary consumer is unquestionably that by estimate, or the constant service; though it occasionally gives rise to waste, in consequence of the taps being left on, and the water being allowed to run away, through sheer negligence.

At the time the treaty of 1860 was entered into, the City had only at disposal the water of the Seine, that obtained from the artesian wells at Grenelle, and the water of the Canal de l'Ourcq, the quality of which is far from satisfactory. It was not until after the treaty had been concluded that the important works were undertaken for bringing to Paris the waters of the Dhuis, the Vanne, and the Marne, by the establishment of the water-works at St. Maur. Naturally the water of the Canal de l'Ourcq, which cannot be supplied to the higher portions of Paris, was charged for at a lower rate than the spring and river water, and no quantity less than a cubic mètre (220 gallons) per day was supplied. The charge per cubic mètre per annum for water was determined according to the following table:—

Quantity supplied per Day.	Charge per Annum. Water of the Canal de l'Ourcq.	Seine and other Waters.
250 litres (55 gallons)	—	60 frs.
500 „	—	100 „
1,000 „	60 frs.	120 „
1,500 „	90 „	180 „
2,000 „	120 „	240 „
3,000 „	180 „	360 „
4,000 „	240 „	480 „
5,000 „	300 „	600 „
5,000 to 10,000 litres (per cubic mètre)	50 „	100 „
10,000 to 20,000 „ „ „	40 „	80 „

For quantities above 20 cubic mètres the Company make special arrangement, though in no case is the charge per cubic mètre less than 25 frs. for the water of the Canal de l'Ourcq, and 55 frs. for the other waters; and they will not supply less than 1000 litres (220 gallons) of the former, or 250 litres (55 gallons) of the latter per diem.

To the original treaty were added, in November, 1860, several fresh regulations, among others those specifying the conditions under which an unmeasured supply of either Seine water or of that from the Canal de l'Ourcq might be obtained. Looking at the scale of charges for the water from both sources, one would naturally suppose that when employed for like purposes the quantity supplied would be the same, though the price would vary according to which water was used; but this was not the case, as will be seen by the following table of comparative consumptions:—

	Water of the Canal de l'Ourcq.	Water of the Seine.
For a resident householder	30 litres.	45 litres.
„ workman	5 „	5 „
„ student or soldier	10 „	20 „
„ horse or cow	75 „	100 „
„ 4-wheel private carriage	100 „	150 „
„ 4-wheel carriage for hire	50 „	75 „
„ shop	100 „	150 „
„ courtyard or garden (per sq. yd.)	3 „	6 „

These are extraordinary differences, and some of them are quite inexplicable. It may readily be supposed that man and beast alike would drink more water of good quality than of inferior, such as that from the Canal de l'Ourcq; but how can it be explained that more of the former than of the latter would be acquired for washing carriages and for the watering of gardens?

The foregoing are some of the principal points in the treaties concluded between the City of Paris and the Water Company. For several years past they have, however, given rise to much dissatisfaction. Not only has the tenor of many of the Articles been sharply criticized, but objections have even been raised to their application. These objections have at length found their way to the Municipal Council. It must be confessed that some of the complaints do not lie at the door of the Water Company —those, for instance, relating to the temporary interruptions which occasionally take place in the supply, and for which, under the terms of the treaty of Feb. 27, 1860, the consumers are unable to claim compensation. These interruptions, which have been caused by a scarcity of water, by repairs, or by the breakdown of the machinery, it must be acknowledged, entail serious inconvenience on the consumers, and measures ought certainly to be taken to remedy such a state of things. The Administration are fully cognizant of the necessity for something being done, and it is hoped that the carrying out of the works proposed by M. Alphand, the present Director of Works, in his latest report on the subject, to which reference was recently made in the JOURNAL, will provide an adequate remedy. The Water Company, as we have said, are not altogether responsible for the interruptions complained of; at the same time it cannot be denied that for some years the Company have appeared to be doing all they could to render themselves unpopular. Their servants have been too hasty in cutting off the water in cases where persons, whose solvency was unquestionable, did not happen to pay their water accounts on presentation; and it should be borne in mind that the accounts are payable in advance. These and other grievances on the part of the consumers have from time to time reached the ears of some members of the Municipality, apart from those constituting the Water and Sewers Committee, who did not fail to make reference to them in reports they might have to present to the Council; and as the result, the whole matter was referred to, and considered by that Committee, who proposed that the following alterations should be made in the conditions under which water is supplied in Paris:—(1) That the Company should supply quantities as low as 125 litres per day, and that in each and every case the price charged should be in proportion to the quantity supplied, instead of being, as before, in inverse ratio to it. (2) That the charges not subject to abatement should be considerably reduced, and be liable to revision after a certain number of years.

Taking their stand on the terms of the existing treaties, the Water Company for some time resisted all demands made upon them for a revision of their conditions of supply; and seeing that their position was, to a certain extent, supported by the old Administration, they simply replied that they could not do anything in the matter. As, however, complaints began to be frequent, and the Company found that, in consequence of the death of M. Belgrand, they would have to deal with a fresh Director of Works, who was by no means imbued with the ideas of his predecessor, they showed themselves more amenable to reason. Early in 1878 negotiations took place with the object of modifying the terms of the treaty of 1860, and in the August of that year the bases of an agreement were settled between the Director of Works of Paris and the Manager of the Water Company. The Municipal Council made certain alterations, and altogether the then existing *régime* was modified thus: From and after the year 1887 the scale of charges for certain works referred to in the 1860 treaty would be no longer in force, and the whole matter was then to be submitted to adjudication. During the intervening eight years these charge were to be subject to an abatement of 25 per cent. The price for water could not be reduced without causing a considerable decrease in the receipts of the Municipality, who, however, were willing to make any sacrifice to ensure for the inhabitants of Paris water of good quality, and in quantity sufficient to meet all their requirements. The constant supply system, it was thought, would be a very great boon to the occupiers of small houses, and it was favourably received by the Council. The supply by meter had been contemplated in the treaty of July, 1860, but that system had not been very extensively adopted, nor would it probably be in the future, the meter being less simple and more costly than the gauge-tap, which had been very greatly improved. However, as many consumers used meters, the Council would have to regulate the charge proposed to be made by the Company for the loan and keeping in repair of these instruments, any consumer being, of course, at liberty to purchase his own, provided it had been approved and stamped by the Administration. From Jan. 1, 1880, constant service was to be abolished, except in cases specified in the treaty, that system being productive of great waste, especially when the taps were fixed on the ground floor. Finally, it was stipulated that thenceforward the draft conditions of consumption should be submitted to the Municipal Council for approval.

A scheme drawn up in conformity with the foregoing propositions was presented to the Municipal Council by the Water and Sewers Committee, the principal points in it being as follows:—

From and after Jan. 1, 1880, all works necessary for the conveyance of water to the houses of the consumers shall be done by the Water Company under the supervision and control of the servants of the Municipality, such works to be done at the cost of the landlords of the houses, and the charges to be fixed according to the scale contained in the treaty of July, 1860, but to be subject to an abatement of 25 per cent.

During the three years 1880-2 the Company are at their own risk and cost to fit up service-pipes in the houses; these pipes to become the property of the landlords. The Company are also to lay on gratuitously a supply to the houses not yet provided with water, and furnish the necessary branch and service-pipes; the landlords undertaking to keep these pipes in repair for a period of five years at least. The expense of laying on these house-services is to be borne by the city to the extent of four-fifths, and a premium of 30 frs. will be awarded to each person taking a supply from a house-service within twelve months from the time of its being fixed. The Municipal Administration are to determine each year the maximum amount of expense to be incurred by the Company in connection with the laying on of water to the houses.

The constant service is to be available for domestic purposes only, and is not to be allowed where any business in which water is required is carried on. The tariff is to be regulated according to the following scale:

For a single tap in an apartment occupied by two or three persons	18 frs. per ann.
For each additional person	4 „ „
For each extra tap—	
In a water-closet	4 „ „
In a bath-room	12 „ „
In any other part of the dwelling	6 „ „
For a shower bath	9 „ „

Householders may have fixed in any storey on which there is no apartment of the yearly value of 300 frs., an extra tap for the benefit of the occupiers of apartments and lodgings only. The price to be paid for this extra supply is to be 18 frs. per annum.

Beyond the cases above specified, the water will not henceforth be sup-

plied in any other way than by meter or gauge-tap, unless in the public interest it may be requisite. A model of each kind of meter, approved by the Administration, shall be deposited at the Prefecture of the Seine. No meter is to be used until it has been tested and stamped by the Administration, who are to have the power of imposing any tests they may think fit. The fixing of the meters is to be done by the Company on the terms approved by the Administration, and, when fixed, they will be left in charge of the consumers, who will have the option of purchasing them if they so desire. The Company agree to let meters to any consumers who may wish to have them on hire, and the rates to be paid are to be settled according to the tariff agreed upon between the Company and the Administration, and are to be payable in advance. This tariff is to be subject to revision every five years by the Prefect of the Seine, at the instance of the Director of Works.

From and after Jan. 1, 1880, the rates to be charged for a supply of water up to 5 cubic mètres (1100 gallons) per day are to be as follows:—

Quantity supplied per Day.	Charge per Annum. Water of the Canal de l'Ourcq.	Seine and other Waters.
125 litres (27·5 gallons)	—	20 frs.
250 „	—	40 „
500 „	—	60 „
1,000 „	60 frs.	120 „
1,500 „	90 „	180 „
2,000 „	120 „	240 „
2,500 „	150 „	300 „
3,000 „	180 „	360 „
3,500 „	210 „	420 „
4,000 „	240 „	480 „
4,500 „	270 „	540 „
5,000 „	300 „	600 „

No smaller quantity than 1000 litres of water will be supplied from the Canal de l'Ourcq, and 125 litres of the Seine water; and, beyond the purposes of the public service, the former is to be employed exclusively for industrial purposes, stables, courtyards, and gardens. In those streets where the level does not admit of a supply of the water of the Canal de l'Ourcq being furnished, the other water will, if circumstances permit, be given instead. During the three years 1880-2, the above tariff will be applicable exclusively to new consumers, wherever the two kinds of service—the public and the private—are established. The quantity of water consumed is to be ascertained by meter or by a gauge-tap, each of which is to be approved of by the Administration. The consumption by meter shall be based upon a minimum selected by the consumer from the preceding tariff, and payment shall be regulated accordingly. The quantity of water registered by the meter will be taken, and an account thereof furnished to the consumer once every three months. No extras will be charged if the consumption does not exceed the minimum determined upon; but should it do so, the consumer will have to pay *pro ratâ*. No deduction will be allowed even if the consumption is below the fixed minimum.

The remaining articles specify, *inter alia*, that in the event of the new convention being agreed to by the Company, it is not to come into operation until after its ratification by the Prefect of the Seine, and the Municipal Council, on behalf of the City; by the Board of Directors and a general meeting of Shareholders of the Water Company; and by the Government.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

A continued want of animation is complained of throughout the coal trade of this district, and there is generally less firmness in the market. The advances which were attempted at the commencement of the year are not being maintained, and in some cases there is a slight giving way in the better classes of round coal. In the house-fire coal trade the demand has been considerably less active than last winter, with the result that stocks have been very little reduced, and the summer will be commenced with an abundance of the better classes of round coal in the market. In gas coals there is, of course, at present very little doing; but with the stocks of round coal left on the hands of colliery proprietors, there is a probability of consumers, when the usual period for giving out contracts arrives, being able to secure supplies on more favourable terms than could have been anticipated a short time back, when a general advance was regarded as almost certain. Prices may not be quite so low as last year, nor sellers so willing to enter into long forward contracts; but there is no indication at present that colliery proprietors will be able to command any very materially higher rates. For manufacturing classes of fuel there is a tolerably fair demand. The iron-works and cotton-mills are taking more of the common classes of round coal and slack; but there is no scarcity of supplies, and colliery proprietors are not able to realize the prices they were expecting. Slack, if anything, has been rather easier during the past fortnight, and of this class of fuel there are heavy stocks in the district. The average quotations at the pit mouth are about as under:—The better classes of round coal, such as good Wigan Arley, 8s. 3d. to 8s. 9d.; second qualities, such as inferior Arley and Pemberton four-feet, 6s. 6d. to 7s. 3d.; common round coal, 5s. 6d. to 5s. 9d.; good slack, 2s. 9d. to 3s. 3d.; and common, 2s. 3d. to 2s. 6d. per ton.

The shipping trade has been very dull, the bulk of the coal for steamers use having lately been drawn from South Wales, and the Liverpool market has during the last week or so been overstocked with Lancashire coal, for which sellers have had to take lower prices.

There is a very fair demand for coke, and prices at the ovens range from 14s. to 17s. for large, and 10s. to 12s. per ton for small cokes, according to quality.

There has been less activity in the iron trade, and a good deal of iron held by merchants and dealers is being offered in the market under late rates. Makers quotations, however, are without material change, and for Lancashire pig iron, delivered into the Manchester district, prices remain at about 70s. per ton, less 2½ per cent., with a good demand still reported for forge numbers. In the finished iron trade makers continue very firm; but ordinary Lancashire bars, delivered equal to Manchester, can be bought from second hands at from £9 to £9 5s. per ton.

A rather better tone is reported amongst founders, engineers, and machinists. One or two good orders have recently been given out, and there are inquiries in the market, which it is hoped will lead to further considerable business.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

A considerable amount of contracting has been done by gas companies within the past six days. What are called the Baltic orders have been placed in the market. The Riga Gas Company have made their contract for 10,000 tons of gas coals, to be composed of Leverson's, Ravensworth, and New Pelton. The Moscow Gas Company have given an order to Old Pelton for 80,000 tons of coals. Messrs. Joicey also sold gas coals under contracts last week; and other contracts are under negotiations. The rates are higher than last year. The freight to Cronstadt represents 7s. a ton. The price of the larger proportion of the gas coals contracted for will be about 7s. per ton.

The shipments of gas coals to London and coastwise were hindered in the early part of last week through the detention of steamers and sailing ships in dense fogs at the lower end of London river, and upon the southern coast the gas collieries are all very busy. There is an excellent demand for coke. A quantity has been sold at 19s. per ton at the ovens, to be sent to the Middlesbrough iron-works. Cargoes of coke are being shipped to Spain. A number of large sailing vessels have been chartered at pretty high rates of freight. Steam and manufacturing coals are in excellent demand. Best steam coals have advanced 2s. per ton, and small coals 1s. per ton, since last October.

The coasting freight market favours the shipper. The rates are 3d. per ton down. There are scarcely any orders in the market for small coasting vessels. Gas coals were shipped last week on the Tyne by steamers to Dublin and by sailing vessels to Waterford and Cork, &c. The Channel rates have been, for sailing vessels, 7s. 6d. per ton to the principal English ports; London, steamers 4s. 3d., and sailers 5s. 3d.; Boulogne, 5s. 9d.; Havre, 6s.

The Cleveland iron trade, sympathizing with the state of business at Glasgow, was dull last week. The price of crude iron was lower. Manufactured iron was in demand; and all the leading factories on the Tyne were very fully employed last week. They are likely to continue busy over the spring. Most of the factories have orders on hand for large forgings. The foundries are at full work with castings. The lead market shows a slight falling off. Buyers hang back and will not pay the high prices asked by the merchants. There has been some "cutting" speculations in this metal, it is said, and the operators experience a difficulty in keeping prices where they are. Copper is higher.

The fire-brick trade is prosperous. Recent advances are fully upheld. There are likely to be large shipments of bricks to the Continent for furnace work with the opening of the spring.

The timber trade is slow. There is little active business doing in any particular department. Upon the trade transacted there is an advance on previous rates. The tendency is in favour of the sellers.

The chemical market is easy for prompt shipments; but the quotations are better for later on.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

When referring to Falkirk gas affairs in last week's "Notes," I made a slip as to the price of gas, which I hasten to correct. The price is now 5s., and the Falkirk Lighting Company have fully resolved to reduce it to 4s. 7d. per 1000 cubic feet, making a reduction of 1s. 3d. per 1000 feet since they took the works in hand.

The quantity of gas manufactured in Inverness during the month of December, 1879, was 3,763,000 cubic feet, as compared with 3,646,000 cubic feet in December, 1878, being an increase of 117,000 cubic feet. The illuminating power of the gas is stated to have been equal to 27 standard candles.

As affording some evidence of the fact that the city of Perth is not a "Sleepy Hollow," as it has been pictured by many people, especially in Dundee, it has just been publicly stated that the consumption of gas within the area of supply has increased 150 per cent. within the past seven years.

A lecture on "Coal and the Coal Tar Colours" was delivered before the Edinburgh Literary Institute last Wednesday evening, by Mr. W. Ivison Macadam, F.C.S., son of Dr. Stevenson Macadam, in the course of which he alluded to the anticipations entertained as to the introduction of the electric light, and to the effect which it would have on the manufacture of gas; and he said it had often occurred to him that, even though gas lighting were to be superseded, gas companies would still have the manufacture of dyes to fall back upon.

Steps are being taken by the law agents of the Peterhead Gas Company to get its affairs wound up. At a recent sitting of the Sheriff Court upwards of two dozen debtors were called, and against whom decree was obtained in absence; and since then a still larger batch of cases was brought up.

At a meeting of the Town Council of Kilmarnock, held last Wednesday, a minute from the Gas Company was submitted, in which it was shown that the preceding month's sale of gas amounted to 5,037,750 cubic feet, realizing £1154 9s. 8d., as against 5,637,800 cubic feet for the corresponding month of 1878, when the sum realized was £1291 19s. 11d. The illuminating power in the last report was—maximum, 29·7 candles; minimum, 28 candles; average, 28·7 candles.

The Dundee Gas Commissioners have just accepted tenders for the erection of a new gasholder of unusually large size. It will be 60 feet high, 150 feet in diameter, and will contain nearly 1 million cubic feet of gas. According to the specifications, the whole work has to be completed by September, 1881. With the exception of half a dozen holders at the Glasgow Corporation Gas-Works, this new holder will be the largest in Scotland. The holders in Glasgow are 160 feet in diameter, by 60 feet high, in two lifts, and have each a capacity of 1,250,000 cubic feet.

The annual general meeting of the Kilmalcolm Gas Company, Limited, was held on Monday, the 2nd inst.—Mr. George Frederick Bryan presiding. From the balance-sheet which was submitted it was shown that there was a balance of £193 16s. 5½d. on the past year's working, which was equal to a profit of 8 per cent. on the capital of £2400. On the recommendation of the Directors, it was agreed to declare a dividend of 5 per cent., and to carry forward a balance of £70 to next year's account. The Directors stated that they had agreed to supply the West of Scotland Hydropathic Establishment with gas at 7s. 6d. per 1000 cubic feet, with 10 per cent. discount if burning gas to the value of £100 per annum. There will be 700 lights in the establishment, and the opening is to take place in April. There are also 20 new villas nearly ready for gas.

The Burgh Commissioners of Johnstone, sitting as Gas Commissioners, recently devoted two meetings to the reading of the minutes connected with the negotiations which eventually terminated in the acquisition of the gas supply undertaking of the town for the public good. The minutes embodied a report on the condition of the plant and works by Mr. Geo. R. Hislop, of Paisley, who had been requested by the Commissioners to prepare it for their information and guidance. Mr. Hislop reported that in the gas-works there are 31 retorts, well set and in good condition. About 60 per cent. of this number are not required during mid-winter, and the remaining 40 per cent. would be sufficient to meet the growing requirements of Johnstone for some years. The condenser is of modern construction, and in excellent condition—fully able to pass twice the maximum gas required in mid-winter. It is too large, however, as it would have been more economical for the Commissioners if it had only been one-half as large as it is. The engine and boiler were reported on as of sufficient power for present requirements. The washer was stated to be worse than useless. The purifiers are altogether inadequate for the requirements of Johnstone in mid-winter. The station-meter is apparently in fair condition,

but is only capable of measuring 3000 cubic feet per hour, and as the consumption in Johnstone rose to 5000 cubic feet per hour in winter, its accuracy of measurement cannot be relied on. The two gasholders are capable of containing 56,000 and 20,000 cubic feet of gas respectively. This total storing capacity of 76,000 cubic feet is only equal to about three-fourths of a mid-winter day's consumption, and is therefore defective. Storeage should be equal to at least one whole day's maximum consumption. The governor is of modern improved construction, and of ample size to meet all requirements for many years to come. The connecting-pipes, Mr. Hislop finds, are too small, and out of all proportion with the apparatus they are connected with. The present coal-store is much too small. The lime-store should be removed and placed in another part of the works; and there should be a workshop erected. Mr. Hislop estimates the cost to put the works in good order at £1548.

A public sale of railway and gas stocks took place at Arbroath on Saturday week. There were sold 6½ shares of the Arbroath Gas Corporation £9 2s. annuities at from £32 12s. 6d. to £32 15s. per share. Glasgow Corporation 9 per cent. Gas Annuities were sold on Monday, the 2nd inst., at £222 5s., and at the same price on Thursday and Friday.

There were frequent and violent fluctuations in the Glasgow pig iron market during the past week, and the course of the market was unusually erratic. As low as 65s. cash was taken on Wednesday, and up to 67s. 7½d. cash was paid on Friday forenoon.

The coal trade shows no marked signs of improvement, but the spring shipping business will open shortly.

Malvern Link Gas Company.—At the half-yearly meeting of this Company, on Thursday last, a dividend of 8 per cent. was declared.

Tamworth Water Supply.—At the last meeting of the Tamworth Town Council, a motion—"That the Mayor be requested to sign, and affix the corporate seal to the agreement with the Tamworth Rural Sanitary Authority for providing a water supply"—was carried. The agreement provides that the Joint Committee for the management of the water-works is to be composed of twelve members of the Rural Sanitary Authority and six members of the Town Council.

The Sewerage of Dublin.—At the meeting of the Corporation of Dublin, on Monday last week, the Town Clerk announced that a communication had been received from the Office of Public Works, announcing that they had received the recommendation of the Local Government Board for a loan of £30,000 to the Corporation for the construction of sewers in the city, the money to be repaid in 30 years, with interest at the rate of 3¾ per cent. per annum.

The Purchase of the Strood Water-Works by the Rochester Corporation.—A special meeting of the Rochester Town Council was held on Friday, the 30th ult., for the purpose of confirming a resolution passed at a previous meeting of the Council, on Jan. 13, authorizing the Mayor and Corporation to promote a Bill in Parliament for empowering them, *inter alia*, to acquire the Strood Water-Works, and carry on the same. The necessary resolutions were unanimously confirmed.

Faversham Water Company.—The annual general meeting of this Company was held on Monday, the 2nd inst.—Mr. S. Higham in the chair. The accounts presented showed the profits for the past year to have been £665 6s., out of which a dividend of 7 per cent. was declared and £22 was added to the reserve-fund. The report which was presented was adopted, and the retiring Directors, Messrs. C. Bryant, J. A. Anderson, and C. Smith, were re-elected; Messrs. H. Anderson and A. Green being re-appointed Auditors.

Starcross and Kenton Gas Company.—The fourth annual general meeting of this Company was held on Monday, the 2nd inst.—the Rev. E. C. Bond in the chair. The Directors report showed that the funds allowed of the declaration of a dividend at the rate of 7½ per cent. out of the cash assets, and of £100 being carried to the reserve-fund, which it was considered necessary to establish for the repair of plant. The Directors recommended that the price of gas should be reduced 10d. per 1000 feet. The report was adopted, and the retiring Directors—the Earl of Devon and Mr. John Haydon—were unanimously re-elected.

Chester United Gas Company.—The annual meeting of this Company was held on Friday, the 30th ult.—Mr. F. L. Bagnall in the chair. The accounts were adopted, and dividends declared on the preference and ordinary stocks and shares. Resolutions were adopted carrying out the other recommendations in the report from the Board, and re-electing the retiring Directors—Messrs. T. Roberts and J. B. Wilcox. The meeting was afterwards made special, to consider the Bill to be promoted by the Company in the ensuing session of Parliament to authorize the raising of additional capital. The Bill was submitted, and a resolution passed unanimously approving of it.

The Opposition to the Liverpool Corporation (Vyrnwy) Water Scheme.—At the Quarterly Meeting of the Bewdley Town Council, held on Monday, the 2nd inst., the question of opposing the above-named scheme came up for discussion. The Mayor (Alderman Marcy), who presided, thought the scheme should be opposed, but that the expense to which the Council should go, in conjunction with other bodies, should be limited to a certain amount. A resolution was passed, on the motion of Alderman Landon, seconded by Mr. Knowles, specifying that the expenditure in opposing the scheme should not exceed a rate of 3d. in the pound. This decision will have to be approved at a special meeting of the Council, and confirmed by a subsequent meeting of ratepayers called for that purpose.

The British Gas Company and their Potteries Station.—A special meeting of the Hanley Town Council was held on Thursday last—the Mayor (Mr. J. Bromley) presiding—to consider the Bill promoted by the British Gaslight Company for obtaining power to enlarge their Potteries station. The proceedings of the Council were conducted in private, the result being, it is said, that, after a lengthy discussion, Mr. Ridgway moved—"That the Bill in Parliament for the purpose of empowering the British Gaslight Company, Limited, to enlarge their works, and to expend further capital at their Staffordshire Potteries station, and for other purposes, be opposed; and that the cost of the opposition be a charge upon the borough funds." This proposal was seconded by Mr. Baker, and carried; and it was also resolved—"That such steps be taken as may be deemed expedient in relation to such object and purpose."

Huddersfield Water and Gas Supply.—In the course of an article on "Huddersfield Improvements," in a recent number of the *Leeds Mercury*, it was stated that in 1869 the Corporation acquired the water-works, at a cost of £59,000, and the money since laid out has run up the total expenditure on the original works to £66,000. The new and better service is to cost £700,000. The Engineers are Mr. T. Hawksley, C.E., and Mr. G. Crowther, of Huddersfield. Three large reservoirs have been constructed—one at Black Moor Foot, another at Deer Hill, and a third in the Wessenden Valley. The water is of excellent quality. Two million gallons are daily sent to Huddersfield, and the service can be extended to three or four million gallons daily. About £660,000 had been expended on these works up to the end of last August, and they are expected to prove a good and useful investment to the residents. In January, 1872, the gas-works were acquired by the Corporation at a cost of £144,000, and the total expenditure on these works up to the present time is about £204,000.

The Sea Water Supply to London Bill.—The Parliamentary Committee of the Metropolitan Board of Works have reported in reference to this Bill as follows:—"By the Sea Water Supply to London Bill it is proposed to lay pipes for the conveyance of sea water through parts of the Metropolis. It appears to your Committee that the mode of carrying out the works under the public ways should be subject to the approval of the Board. Among other works, it is proposed to carry a syphon under the bed of the River Thames from Putney to Fulham, and as it is possible that a syphon at that point might interfere with the construction of a new bridge at Putney, should it be hereafter found necessary to replace the present structure by a new one, it may be well to call attention to this point. Your Committee accordingly recommend that a petition be presented against the Bill." This was agreed to.

Croft and Hurworth Gas Company.—The forty-fourth half-yearly meeting of this Company was held on Monday, the 2nd inst.—Col. Scurfield presiding. The Secretary (Mr. J. T. Hall) read the report, which stated that the income during the last half year was £441 15s. 1d., and the expenditure on revenue account £230 2s. 6d., leaving a profit of £211 12s. 7d. available for dividend. It was proposed to declare a dividend at the rate of 6 per cent. per annum. After paying this dividend there would be a balance of £66 17s. 7d., which sum would be placed to the credit of the reserve-fund, which would then amount to £209 11s. 2d. During the past half year a complete set of new purifiers had been erected, and the works were in efficient order. The Chairman moved, and Mr. Brown seconded the adoption of the report, which was agreed to. The retiring Director (Mr. G. J. Scurfield) and Auditors (Messrs. Walton and Alderson) were re-elected, and the usual votes of thanks concluded the proceedings.

Alcester Water Company, Limited.—The second annual meeting of this Company was held on Monday, the 2nd inst.—Mr. H. Overbury presiding. The report stated that the works had been extended into the Moors and other parts of the town; that 215 houses were now supplied with the Company's water; and that the Board had arranged with the Alcester Sanitary Authority to flush the town sewers with the Company's water. Preference shares, to the extent of £825, in addition to the original ordinary shares, had been issued during the year. A discussion took place on the accounts, from which it seems that the total present liabilities of the Company amount to about £800, of which £517 is owing to the bank, the remainder being for legal charges, &c. The principal question was how to meet this liability. The subject was eventually adjourned, to admit of the exact amount of the liabilities being ascertained. The report was adopted, and Messrs. J. Jones and R. Sheaf, the retiring Directors, were re-elected.

Cleaning the Consett Water Company's Mains.—During the past fortnight men have been busily engaged in cleaning out the mains between the Consett Water Company's reservoir on the Fells, at Waskerley and the town of Consett. The cleansing process is accomplished by means of a "ferret." The mains were found to be in an exceedingly filthy state, the ferret having forced out, in addition to a thick coating of slimy matter (evidently peat), shovels, sprags, and other articles which seem to have slipped into them either at the reservoir or whilst the pipes lower down have been from time to time under repair. For some weeks past, owing to the absence of a wire gauze at the spot where the water leaves the reservoir and enters the main, young fish (trout and minnows) have entered the pipes, and numbers have, one of the local papers states, actually succeeded in forcing their way alive through the taps, after swimming through the mains for a distance of over ten miles.

Dearne Valley Water Bill.—Last Wednesday a meeting was held of ratepayers and inhabitants of Darfield, for the purpose of hearing statements from the promoters of the Dearne Valley Water Company with respect to the supply of water to Darfield. It may be remembered that a vestry meeting was held on the previous Thursday, when it was resolved to request the Sanitary Authority of Darfield to petition Parliament to have the township of Darfield expunged from the Bill. Mr. Joseph Mitchell, Engineer, and Mr. Robinson, Secretary of the Company, attended. Mr. Robinson, in addressing the meeting, said it was convened in consequence of the wild statements which had been made at the previous meeting. The Dearne Valley Water Company would supply the district with good and pure water, so far as it was possible, at the cheapest rate. They would either supply it in bulk to the township at 6d. per 1000 gallons, or supply it to consumers direct. Mr. Mitchell explained that the water would be obtained from Wath Main, Mitchell's Main, and Darfield Main, and the supply would be large and constant. A number of eminent chemists had certified as to the quality of the water.

The Dagenham Sewage Utilization Bill.—In the course of a report which was adopted at the meeting of the Metropolitan Board last Friday, the Parliamentary Committee state: "By the Dagenham and District Farmers (Optional) Sewage Utilization Bill it is proposed to form a Company to take the sewage from the northern main outfall sewer, and convey it for the fertilization of land in the county of Essex. It is provided that the Board and the Company may enter into contracts with respect to the sewage. It appears to your Committee that the time for the compulsory purchase of the land should be reduced from five to two years, and for the execution of the works from seven to four years from the passing of the Act. It would also be well to require the Company to deposit a substantial sum, say £15,000, in the hands of the Board, to be forfeited at the end of two years in the event of the Company not having by that time acquired the ground requisite for the purposes of the Act, and not having expended upon the works a sum of not less than £50,000. It would also be better that a royalty should be reserved to the Board than that a fixed charge per 1000 gallons should be made, as proposed in the Bill. The Board should also have full power to enter upon the works, and to examine the books of the Company; and upon the failure of the Company to complete the works within the time named in the Act, the Board should be entitled to appropriate without payment all the works upon the Board's land. Your Committee recommend that a petition be presented against the Bill."

Society of Engineers.—The first ordinary meeting of this Society for the present year was held on Monday, the 2nd inst., in the Society's Hall, 6, Westminster Chambers, Victoria Street. At the conclusion of the ordinary routine business, Mr. R. P. Spice, the Past-President, presented the premiums of book which had been awarded to the following gentlemen for papers read during last year, viz.:—To Mr. Charles John Alford for his paper on "The Mineralogy of Sardinia," and to Mr. Thomas Andrews for his paper on "Wrought-Iron Axles." On the motion of Mr. H. P. Stephenson, seconded by Mr. T. Porter, a cordial and unanimous vote of thanks was passed to Mr. Spice for his services as President during the last two years. Mr. Spice then introduced the newly-elected President, Mr. Joseph Bernays, who delivered his Inaugural Address. He first expressed his thanks to members for the honour they had conferred upon him in electing him President. After alluding to the efficient manner in which Mr. Spice had filled the presidential chair for two successive years, and the hesitation he, as a foreigner, felt in following such a successor, he gave some

good hints to young members on the writing of papers. Mr. Bernays next referred to the work and use of the Society, and finally selected "The Position of the Society in its Relation to the Profession at Large" as his subject. Glancing at the interesting papers which had been read during the year 1879, and the visits made by the Society to various works of interest during that year, Mr. Bernays, in a most able manner, proved that the Society was of the greatest use and benefit to all classes of Engineers, and to the furtherance of engineering science and knowledge, without clashing with any other society. Mr. Bernays said he regretted the loss of the valuable services of Mr. P. F. Nursey, their late Secretary, who was now, however, still useful to the Society as a Member of Council, and concluded with some general remarks concerning the financial and numerical position of the Society.

Birmingham Corporation Water Supply.—The minutes of the Water Committee presented to the Quarterly Meeting of the Birmingham Town Council last Tuesday contained a report by the Engineer (Mr. Gray) respecting additional pumping-engines at Aston. In it he states: "In 1860 the total quantity of water supplied to the district was 1408 millions of gallons; in 1870 this quantity reached 2508 millions of gallons; and this last year 3584 millions of gallons; so that the increase has been, from 1860 to 1870, 1100 millions of gallons per annum; from 1870 to 1879, 1076 millions of gallons per annum; together, 2176 millions of gallons per annum, in 19 years, being nearly 6 million gallons per day. During the year 1865 the supply at Aston had so much increased that it was necessary to have additional engine power, and in 1866 the two engines, 'Eagle' and 'Hawk' were started, which relieved the great strain on the four engines then at Aston. In 1873 the supply delivered from Aston was, I considered, too much to be depending solely on the engine power at that station, and I recommended the dividing of the district, so that the engine power at Plants Brook and Whitacre should supply a portion direct. This was done in 1874 by carrying a 24-inch main from Aston through Nechells, and by this means the Aston engines were relieved. There are now at Aston six engines, and the supply to them is furnished by Aston well, Perry well, Perry pool, Witton pool, King's Vale engine and half Short Heath engine. I consider the Aston engines are quite equal to distribute the quantity derived from all these sources, but as the supply increases the maximum increases at a greater ratio than the average, and during the last frost I was for a short time compelled to have at work all six engines at Aston, a circumstance that never occurred before, and could not have been if the new 30-inch main, which was constructed in 1879, had not been laid. In order, therefore, to make proper provision for the increased and increasing requirements for water, I beg to recommend that further engine power be erected at Aston, on the north side of the present engines." The Committee requested authority to proceed, without delay, with the works recommended. The statement of the water-works accounts showed that the income last year was £114,132 18s. 8d., including £111,841 5s. 8d. from water-rents. The gross profit for the year was £77,967 15s. 3d., and the surplus profit £10,702 10s. 7d. The reserve-fund account amounts to £18,215 7s. 3d.

The Gas Supply of Long Eaton.—On Monday, the 2nd inst., a meeting of the Long Eaton Local Board was held for the purpose of further considering the question of purchasing the works of the Long Eaton Gas Company, Limited, or opposing the application of the Company for a Provisional Order. Mr. Fletcher occupied the chair. The Clerk reported that he had received a letter from the Secretary of the Company, in which he said: "The Directors are not unwilling to sell the concern if the Local Board desire to purchase of the Company; but inasmuch as the Local Board are not prepared to name the sum, the Directors suggest that the matter be referred to arbitration." He also said that in answer to a requisition, the Local Government Board had directed an inquiry to be held on the matter; and in reply to a question, stated that although an offer of £18,000 in an unofficial manner had been made for the works, no real and legitimate action had been taken. In the course of the discussion which followed, Mr. Hooley said he would vote for £18,000 being paid for the works, being at the rate of £7 10s. per share; but the Clerk said it was preposterous to offer this, as he could assure the Board that he had recently offered £9 per share, and could not effect a purchase. A letter was subsequently read from one of the townspeople, who suggested that the Board should offer a reasonable price, say £8 10s per £5 share, which he considered a fair value at the present market price. He said he would rather give a little more than come to litigation, which would cost not less than £500. Mr. Hooley then proposed that the Board oppose the Provisional Order, and that the expense of doing so be paid out of the general district rate of the parish. Mr. Dickson seconded the motion; and, on a show of hands, there were two for and two against (Shareholders in the Company not voting), and the resolution was declared not carried. Mr. Mackern then proposed that a Committee of the Board, composed of members who were not Shareholders, meet the Directors of the Company, with a view to the purchase of the works. Mr. Newsum seconded this proposal, which was carried, and the deputation was appointed.

Register of Patents.

3997.—Dowson, J. E., Claverton Street, London, "*Improvements in apparatus for the manufacture of gas.*" Patent dated Oct. 10, 1878.

This apparatus for making water gas for heating, illuminating, or other purposes, consists of one or more gas generators arranged vertically or otherwise with special furnace-bar appliances, and through the incandescent fuel a blast of superheated steam is forced. The grate is formed so that the whole or a portion can be moved open, slid out, or withdrawn so as to allow of the removal of the clinkers. The steam blast is arranged so that it may play when required into an opening in the generator, through which air can be drawn, the diameter of the hole being larger than that of the hole in the nozzle or pipe, which is fitted with a moveable cap to regulate the admission of steam. The heating power of the water gas may be increased by introducing hydrocarbons into the generators. Retorts, with one or more partitions running nearly the whole length, so as to increase the heating surface, are arranged to make illuminating gas by converting the vapours of hydrocarbons into permanent gas, either before or after mixing with the water gas made in this apparatus.

3999.—Goodson, H. E. T., Fulham Road, London, "*Improvements in pressure-reducing valves for gas, steam, or water pipes.*" Patent dated Oct. 10, 1878.

According to this invention a valve-box, containing a double-acting valve, is placed between the main and service pipes. This box is in two parts, one containing a pressure valve opened by the pressure from the main, and connected (by a spindle on its back side) with a circular flexible valve of india-rubber or other elastic material, the surrounding portion of the valve being secured between the meeting flanges of the valve-box, and perforated internally close to the box with a ring of holes for the passage of the fluid. This valve is of larger area than the pressure valve. Round the latter is a moveable ring perforated with holes, and on the top edge is carried a plate, in which is a stuffing-box for the connecting spindle, its upper projecting edge forming the seat of the flexible valve. Projecting from the inside of the other part of the box is a second ring perforated with holes, and its lower edge taking on to the flexible valve where it rests on its seat. The pressure from the main opens the pressure valve and passes through the holes in its surrounding ring, and through the holes in the second ring into the valve-box and service pipe above the flexible valve, which being of larger diameter than the pressure valve, the pressure of the fluid on its upper side is greater than that on the under side of the pressure-valve, and this latter is consequently closed, and the pressure in the service-pipe thereby reduced.

4003.—M'Dougall, A., Penrith, and Hepworth, J., Carlisle, "*Improvements in the purification of gas and separation of products therefrom.*" Provisional protection only obtained. Dated Oct. 10, 1878.

This invention relates in the first part to the removal of carbon disulphide from gas used for illuminating and other purposes; and in the second part to the separation of the carbon disulphide, and its collection for use in any of the processes to which it is commonly applied.

In carrying out the first part of the invention the gas is passed through sawdust, spent bark, or such other material as will present a large surface to the contact of the gas. The material so used is previously to be charged and intimately mixed with oil, and then placed upon grids or supports perforated or provided with holes for the passage of the gas. These grids are then placed in scrubbers or purifiers furnished with inlet and outlet junctions, also with a perforated plate in the interior immediately beneath the top, to admit and spread the oil over the material on the first grid. The oil percolates through the material on the first or highest grid on to the material on the second, and so on through the series, and meeting the gas as it passes upwards, separates and carries down with it the carbon disulphide. The oil so charged passes finally through the tube at the lower part of the scrubber or purifier into the vessel placed for its reception, whence it overflows into a second vessel, for the purification or separation therefrom of the carbon disulphide. After purification by the separation of the carbon disulphide, the oil is used a second time, and so on continuously.

In carrying out the second part of the invention, the carbon disulphide is separated from the oil used in purifying the gas by distillation, or by hot air or steam, and is afterwards prepared for commercial use by any well-known method.

4097.—Hackney, W., Newport, Mon., "*Improvements in regenerative gas furnaces.*" Patent dated Oct. 15, 1878.

In this furnace a flame is obtained commencing only in the working chamber of the furnace, and directed downwards on to the matters to be heated, either by introducing the gas into the working chamber in one, two, or more horizontal or inclined (and preferably parallel) streams, and directing the air downwards upon it in, say, an equal number of vertical streams, or streams more steeply inclined than those of the gas, which air streams are immediately over the streams of gas. Each of the ports through which the air is admitted is so much wider than the corresponding gas port, that the stream of air laps round the stream of gas and partly mixes with it, instead of simply beating the gas down and remaining altogether above it.

4102.—Wirth, F., Frankfort-on-the-Maine, Germany, "*Improvements in automatic gas-burners.*" A communication. Patent dated Oct. 16, 1878.

This invention consists in automatically lighting a gas-burner flame by means of a sudden increased pressure, such increase being effected at the gas-works, so that any number of gas-jets can be ignited or extinguished at will. The apparatus has two burners—the burner proper, and a small burner, which serves to turn on and light the large burner. The extinguishing of the light of the large burner is accomplished in the same manner—that is, by a sudden enlargement of the small flame, which afterwards subsides to its original size. As the small flame shoots up it causes a liquid to expand and give off vapours, which (the liquid being contained in a cylinder) lifts a piston and turns on the gas to the large burner and ignites the same, whereupon the small flame sinks to its normal size.

4204.—Haddan, H. J., Strand, Westminster, "*Improvements in valves and cocks.*" Patent dated Oct. 22, 1878.

This invention consists, firstly, in combining the elements of a screw stem guided to an axial position relatively to the valve-seat, with an ordinary loose disc or flexibly attached valve; secondly, in the provision of a locking device, whereby such valve-disc, when worn unequally, can for the time being be rigidly united with its stem, for the purpose of being ground or re-ground to its seat through the instrumentality of the stem; also in securing such discs to the stem for re-grinding, whereby the loose disc valves are locked through the medium of the stem.

4223.—Johnson, J., Pendleton, Lancs., and Hilton, M., Prestwich, "*Improvements in arrangements and apparatus for the manufacture of gas.*" Provisional protection only obtained. Dated Oct. 23, 1878.

This invention relates to improvements upon the mode of making gas described in patent No. 4576, Dec. 3, 1877 [See Journal, Vol. XXXIV., p. 226], and consists in employing, instead of revolving retorts, stationary ones, formed of any section and material; but constructed so as to enlarge from the end at which the coal is fed to the opposite end at which the coke is discharged. The coal, in small lumps, is placed in a hopper closed by a lid and sealed by a water-joint, and descends from the hopper to a chamber communicating with the small end of the retort. In this chamber is a screw which propels the coal into and through the retort; or a reciprocating piston or other arrangement may be used for the purpose.

The coke discharged at the large end of the retort falls into a chamber from which the gas generated ascends by a pipe. The lower end of this chamber cones or contracts into a hopper or shoot, and descends into a well having water in it to act as a seal to prevent the escape of gas, the hot coke dropping into this shoot and accumulating to a given height in it, so that the upper surface is hot coke. At the lower part of the shoot in the well is a screw arrangement which propels the coke from the well up an incline, and discharges it above the surface of the water in the well into a waggon or other receptacle.

When several of these retorts, up to, say, seven, are combined together, each retort has a separate feeding apparatus as described, but they are all arranged to discharge the coke into one common chamber and shoot.

4253.—Ramage, P., Edinburgh, "*Improvements in valves for controlling or regulating the passage of fluids and liquids.*" Provisional protection only obtained. Dated Oct. 24, 1878.

According to these improvements, that part of the pipe at which the controlling medium is to be situated is provided with a butterfly or puppet valve, arranged to open in the direction of the pressure of the fluid or liquid in the pipe or valve. When shut, the valve is held down on its seat, and against the pressure, by a cam or eccentric formed on a spindle passing through the walls of the pipe behind the valve, and so arranged that when the spindle is caused to perform a quarter, or nearly a quarter of a turn, the cam or eccentric acts upon the back of the valve, and by forcing it down upon its seat cuts off the supply of liquid or fluid.

APPLICATIONS FOR LETTERS PATENT.

422.—Lyon, T. G., Peckham, London, "Improvements in the construction of water-pipes for the purpose of preventing injury to the same by the action of frost." Jan. 30, 1880.

432.—Brouardel, E. P., Paris, "Improvements in gas-pressure registers." Jan. 31, 1880.

444.—Vaughan, G. E., Chancery Lane, London, "Improvements in the construction of gas-generating furnaces." A communication. Jan. 31, 1880.

457.—Mewburn, J. C., Fleet Street, London, "Improvements in or applicable to gas lamps and burners." A communication. Feb. 2, 1880.

463.—Budenberg, A., Manchester, "Improvements in apparatus for lifting and forcing water and other fluids." A communication. Feb. 3, 1880.

469.—Brougham, F. J., Westminster, "Improvements in or connected with globes or lanterns for lamps or other lighting apparatus." A communication. Feb. 3, 1880.

484.—Brown, T., Rood Lane, London, "Improvements in and apparatus for uniting lead piping." A communication. Feb. 4, 1880.

490.—Bean, W. J. and A. T., Westminster, "Improvements in water-closets, and in waste-preventing cisterns and supply-valves for discharging measured quantities of water or other liquids." Feb. 4, 1880.

499.—Bower, G. and A. S., Saint Neots, Huntingdon, "Improvements in lighting with compressed gas, and in the apparatus employed therein, especially applicable to railway and other carriages, ships, buoys, and isolated buildings." Feb. 4, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3232.—Gedge, W. E., Strand, London, "Improvements in kilns, ovens, or furnaces in continuous firing heated by gas or by solid fuel, for firing, baking, or burning ceramic ware, cement, plaster, lime, and other manufactures." A communication. Aug. 12, 1879.

3233.—Simon, R., Nottingham, "Improvements in gas-engines worked by the combustion or explosion of a compressed mixture of gas and air or hydrocarbon and air." Aug. 12, 1879.

3470.—Lake, W. R., Southampton Buildings, London, "Improvements in and relating to apparatus for supplying cities and other places with water." A communication. Aug. 28, 1879.

3562.—Lake, W. R., Southampton Buildings, London, "An improved method of and apparatus for manufacturing carburetted hydrogen gas." A communication. Sept. 4, 1879.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

227.—Pawson, W., "Improvements in and connected with water-closets." Jan. 17, 1877.

252.—Clerk, D., "Improvements in motive-power engines working with hydrocarbon gas or vapour." Jan. 19, 1877.

259.—Tassié, P., "Improvements in means or arrangements for closing the mouth-pieces of gas-retorts, and in tools for applying the same." Jan. 20, 1877.

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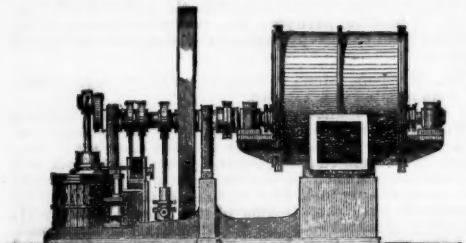

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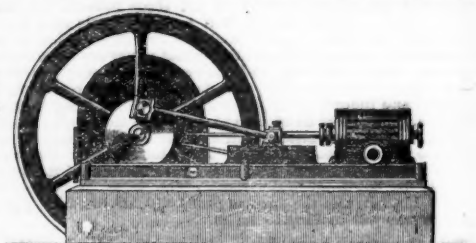

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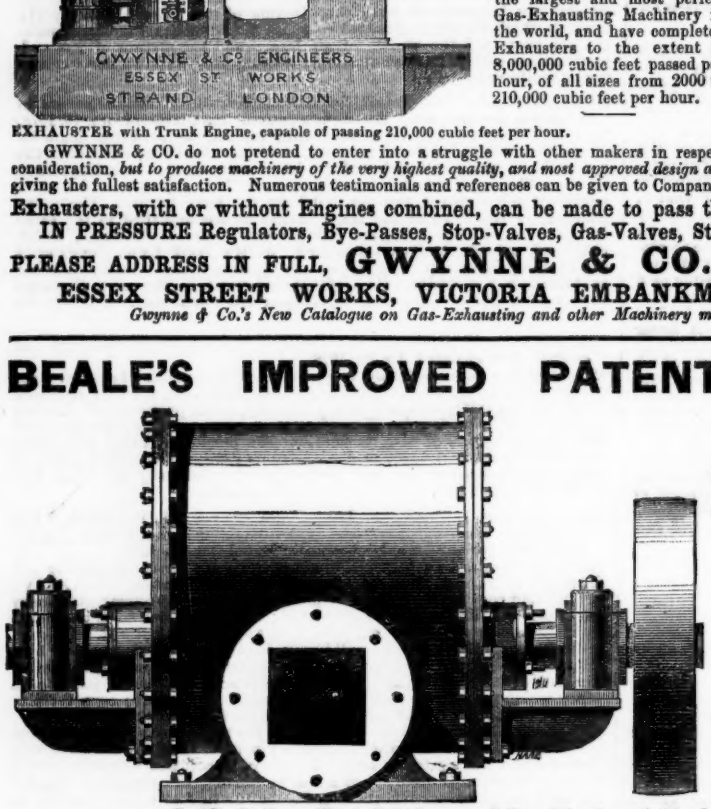

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G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

PHŒNIX ENGINEERING WORKS:
HOLLAND STREET, SOUTHWARK, S.E.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, a Working Foreman Stoker for the Newton Gas Company, carbonizing about 2000 tons of coal yearly. Wages 28s. per week, with house, gas, and firing.
Apply, with testimonials, to the Secretary.
By order,
JAS. CHAPPLE, Secretary.

WANTED, an intelligent Working MAN to take charge of small Gas-Works. Highest winter make under 100,000 cubic feet per week. Must be able to Fix Meters, Take Indexes, and do the general work of Gas-Making. A good character for honesty, sobriety, &c., absolutely necessary. Comfortable house, firing, and light found.
Address, stating age, wages required, &c., to No. 637, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRURO GAS COMPANY.

WANTED, by the above Company, a thoroughly practical Man as a GAS-FITTER. One who understands bronzing and lacquering would be preferred. To a steady and competent man, the situation would be a permanent one.
Applications, enclosing testimonials, with references, and stating wages expected, to be addressed to the Secretary, Mr. J. HAMILTON.
Truro, Feb. 6, 1880.

FOREMAN WANTED.

WANTED immediately, by the Hednes- ford (Staffordshire) Gas Company, a FOREMAN; one who can do Internal Fitting preferred. He will be required to Lay Mains and Services, and do general repairs on the Works, and must be sober and steady. Wages 25s. per week, with house (on the works), and a reasonable supply of coal and gas free.
Applications and testimonials to be addressed C. E. BALL, 18, Leicester Road, LOUGHBOROUGH.

ARUNDEL GAS COMPANY.

WANTED, by the above Company Four Good PURIFIERS (second hand), not to exceed 8 ft. square, with Dry Centre-Valve, Grids, Covers, and Lifting Gear complete.

In consequence of enlargement of Works, the Company have for DISPOSAL Two Double Purifiers, 8 ft. by 4 ft., with Two 6-in. Four-way Valves and Connections; Wood Sieves, Covers, and Lifting Gear, nearly new. Also a STATION-METER 2000 ft. per hour; 4-inch Connections; Clock and Tell-tale arrangements.
Particulars, including price, and where to be seen, to be sent to W. C. Dawson, Manager, Gas-Works, Arundel.
By order,
RICHARD HOLMES, Secretary.
Arundel, Feb. 6, 1880.

TO GAS ENGINEERS.

THE Directors of the Sheffield United Gaslight Company require the services of a Resident ENGINEER. The requisite qualifications are a thorough Practical Knowledge of Engineering, Preparation of Plans, and Construction of Works; the Manufacture and Distribution of Gas; and of Chemistry as applied to its Manufacture and Purification; also of the Making of Sulphate of Ammonia.
Applications, not later than the 14th prox., to be addressed to the Chairman of the Company, stating qualifications, age, salary required, references, &c.
Testimonials in the first instance are not required.
Offices, Commercial Street, Sheffield, Jan. 10, 1880.

RETORT CARBON.—About 40 Tons ON SALE.
Further particulars on application to Mr. GEO. B. JACKSON, Gas Department, Town Hall, MANCHESTER.

GAS COKE.

A LARGE QUANTITY required for delivery over a period of nine months.
Address, with price per ton into trucks at railway station, to G. J. EVESON, Gas, Coal, and Cannel Contractor, BIRMINGHAM.

MESSRS. W. and B. Cowan have for Sale:—
One 2000 ft. per hour Second-hand Station-Meter.
Two 3000 " " "
One 4000 " " "
All in good order, having been replaced by us with larger ones.
Prices on application to their factories in London, Manchester, and Edinburgh.

CHEMICAL WORKS TO LET.

THE Burnside Chemical Works, Ayr, for the Distillation of Gas, Tar, and Water. Manufacture of Sulphate of Ammonia, Naphtha, Oil, Pitch, Lampblack, &c.
The Works are very conveniently situated for communication by rail and sea.
Apply to JAMES CAMPBELL, Writer, SALTCOATS.

CORPORATION OF LEICESTER—GAS DEPARTMENT.

EXHIBITION OF GAS-ENGINES, COOKING-STOVES, BURNERS, AND OTHER APPARATUS.

THE Gas Committee of the Corporation of Leicester intend holding, from the 12th to the 17th of April next, an EXHIBITION of all kinds of Apparatus or Appliances showing the Advantages and Economical Uses of Gas for Engine, Cooking, Domestic, and other purposes. They will provide space, gas, and connections free, and give Certificates of Merit.
Intending Exhibitors will be furnished with printed conditions, forms for allotment of space, and any further information, on application to
G. A. AND C. S. ROBINSON, Managers.
Gas Offices, Millstone Lane, Jan. 23, 1880.

THE BROMLEY GAS CONSUMERS COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Thursday, the 26th day of February inst., at Six o'clock precisely, to receive the report of the Directors, the balance-sheet confirmed by the Auditors, to declare a dividend, and for general purposes.
By order of the Board,
GEORGE H. OSBORN, Secretary and Manager.
Offices at the Works, Bromley, Kent, Feb. 10, 1880.

THE MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.
INCORPORATED BY ACT OF PARLIAMENT, 1867.
NOTICE is hereby given that the TWENTY-SIXTH ORDINARY HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of this Company will be held in the Board-Room at the Works, Mitcham, in the County of Surrey, on TUESDAY, the 24th day of February, 1880, at Three o'clock in the afternoon precisely, to declare a Dividend for the half year ending the 31st day of December, 1879, to elect two Directors and one Auditor, and for general business.
The Directors who retire by rotation at this meeting are John Child and Robert Rice, Esqs., who, being eligible, offer themselves for re-election.
The retiring Auditor is John Wade, Esq., who, being eligible, also offers himself for re-election.
The Transfer Books will be closed from the 9th till the 24th day of February inst.
By order,
BENJAMIN GREEN, Secretary and Manager.
Board-Room, Mitcham, Surrey, Feb. 3, 1880.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for the Erection of a COAL STORE, RETORT-HOUSE, &c., for which plans and specifications may be seen on application.
The Committee do not bind themselves to accept the lowest or any tender, which should be sent in not later than the 11th of February, addressed to the Chairman.
WILLIAM A. VALON, Engineer.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for Supplying and Fixing IRON ROOFS for Coal Store and Retort-House. Plans and specifications may be seen on application.
The Committee do not bind themselves to accept the lowest or any tender, which should be sent in not later than the 11th of February, addressed to the Chairman.
WILLIAM A. VALON, Engineer.

THE Mansfield Improvement Commis- sioners (Gas Department) have FOR SALE a quantity of GAS PLANT suitable for small Works, viz.:—
Ash Pans.
Iron Retorts, 16 in. by 15 in.
Ascension, Bridge, and Dip Pipes.
Lengths of Hydraulic Main.
12 yards of 8-in. Flange Pipes suitable for a pump lift or steam pipes.
Apply to the MANAGER, Gas-Works, MANSFIELD.

TO TAR DISTILLERS.

THE Directors of the Devonport Gas Company are prepared to receive TENDERS for the Surplus TAR produced at their Works for One year from the 1st of February, 1880.
Specification on application to the Secretary.
Tenders to be delivered not later than Monday, the 16th inst.
JOHN WILLING, Secretary.
Dated Feb. 6, 1880.

ROCHDALE CORPORATION.

THE Water-Works Committee invite TENDERS for the supply of 1500 yards of 3-inch PIPES, to be delivered in waggons at the railway station, Rochdale.
All information can be obtained from Mr. Rofe, Water-Works Manager, Lord Street, Rochdale.
Tenders, endorsed "Tender for Pipes," to be sent to me on or before the 17th of February inst.
By order,
ZACH. MELLOR, Town Clerk.
Town Hall, Rochdale, Feb. 6, 1880.

GAS PLANT FOR SALE.

THE Gas Committee of the Corporation of Birmingham have for Sale, at their Fazeley Street Works, which are now closed, the following PLANT, viz.:—
Mouthpieces, 206 D-shaped 18 in. by 13 in., with wrought-iron Lids and Cross Bars.
Mouthpieces, 26 D-shape, 16 in. by 12 in., with wrought-iron Lids and Cross Bars.
Also 27 15-in. Circular, fitted with Morton's Self-Sealing Lids and Holman's Fastenings, together with 4 in. and 5-in. Ascension, U, and Dip Pipes, and D-shaped Hydraulic Main, &c.
Battery Condenser.
Annular "
Cast-Iron Measuring Tank, 18 ft. by 13 ft. by 4 ft.
Cast-Iron Scrubbers, four 18 ft. by 4 ft. diameter, and one 24 ft. by 6 ft. diameter.
Six 16 ft. Square Purifiers, with Lifting Crane, 14 in. Connections, Valves, &c.
Two 8-horse power Vertical Engines.
One Cornish Boiler, 4 ft. 6 in. diameter by 16 ft., by Fernihough and Sons, of Dukinfield.
One Egg-ended Boiler, 3 ft. 6 in. diameter by 12 ft.
One 20,000 cubic feet per hour Jones's Exhauster.
One 50,000 " " "
One Hayward Tyler's "Special" Pump, with 4-in. Inlet and 5-in. Outlet.
One 40,000 cubic feet per hour Station-Meter.
One 20,000 " " "
One Cart-Weighing Machine.
12 in. and 14 in. Disc and Slide Valves, &c.
One 60-inch Letheby Photometer and Testing Apparatus.
Three Telescopic Gasholders, 62 ft. diameter by 34 ft. high.
Two 8-in. Governors.
For further particulars and to view, apply to Mr. CHARLES HUNT, Engineer, Gas-Works, Windsor Street, BIRMINGHAM.

BARNET DISTRICT GAS & WATER COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of the above mpany will be held at the Guildhall Tavern, Gresham Street, in the City of London, on FRIDAY, the 27th day of February, 1880, at One o'clock in the afternoon precisely, to receive the Report of the Directors, and the Accounts for the half year ending the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, to fix the remuneration of the Directors, and to transact the general business of the Company.
The Transfer Books will be closed from the 14th to the 27th inst., both inclusive
By order of the Board,
ALFRED LASS, Secretary.
Offices, 38, Gracechurch Street, London,
Jan. 30, 1880.

TENDERS WANTED.

THE Forfar Gas Corporation is prepared to receive TENDERS for the Furnishing and Erection of Two PURIFIERS at the Gas-Works, Forfar, each of them 12 ft. square by 4 ft. deep, with suitable Valves, Connections, and Lifting Apparatus.
The plan and specifications will be seen in the hands of the Manager at the Works, and sealed tenders, marked "Tender for Purifiers," must be lodged with WILLIAM GORDON, Solicitor, FORFAR, Clerk to the said Corporation, on or before the 21st day of February, 1880.
The lowest or any tender may not be accepted.
Corporation Gas-Works, Forfar, Jan. 28, 1880.

TENDERS WANTED.

THE Forfar Gas Corporation is prepared to receive TENDERS for the following Works:—
First. The Furnishing and Erection at the Gas-Works, Forfar, of a Telescopic Gasholder, in Two Lifts, each 18 ft. deep—Outer Lift, 60 ft., and Inner Lift, 58 ft. 3 in. in diameter.
Second. The Converting of the present 60 ft. Single-Lift Gasholder into a Telescopic Gasholder of Two Lifts, the Inner Lift being 58 ft. 3 in. in diameter and 18 ft. deep.
The plans and specifications will be seen in the hands of the Manager at the Works, and sealed tenders, marked "Tender for Gasholders," must be lodged with Mr. WILLIAM GORDON, Solicitor, FORFAR, Clerk to the said Corporation, on or before the 21st day of February, 1880.
The lowest or any tender may not be accepted.
Corporation Gas-Works, Forfar, Jan. 28, 1880.

GASHOLDER.

THE Directors of the Isle of Thanet Gas Company are prepared to receive TENDERS for the Construction of a GASHOLDER, 108 ft. in diameter, at their works at Margate.
The plans and specification can be seen on application to Mr. H. E. JONES, Gas-Works, Stepney, E.
Tenders, endorsed "Gasholder," and addressed to the Chairman, are to be sent in to the Company's Office, at Margate, not later than Thursday, the 26th of Feb. inst.
The Directors do not bind themselves to accept the lowest or any tender.
THOS. C. FULLER, Secretary.

GASHOLDER TANK.

THE Directors of the Isle of Thanet Gas Company are prepared to receive TENDERS for the Construction of a GASHOLDER TANK, 112 ft. in diameter, at their works at Margate.
The plans and specifications can be seen on application to the Engineer, Mr. H. E. Jones, Gas-Works, Stepney, London, and copies of same at the Thanet Gas Office at Margate.
Tenders, endorsed "Gasholder Tank," to be sent in to the Office of the Company, at Margate, addressed to the Chairman of the Gas Company, not later than Thursday, February 26, 1880.
The Directors do not bind themselves to accept the lowest or any tender.
THOS. C. FULLER, Secretary.

WEST BROMWICH GAS-WORKS.

CONTRACT No. 9.

THE West Bromwich Improvement Commissioners are prepared to receive TENDERS from competent persons for excavating, for making good after, and Laying and Jointing the Main Pipes, Valves, and Appendages required to be laid at the Gas-Works, and in the district of the Commissioners.
Copies of the specification may be seen, and forms of Tender, with the probable quantities obtained, on application at the Offices of the Engineer, Mr. G. W. Stevenson, 38, Parliament Street, Westminster, or to me at the Town Hall, West Bromwich, on and after Friday, the 6th day of February inst., and sealed Tenders must be sent in on or before Friday, the 27th day of February inst., addressed to me at the Town Hall, West Bromwich, and endorsed "Tender for laying Main Pipes and Appendages."
CHARLES BAYLEY,
Clerk to the Improvement Commissioners.
Town Hall, West Bromwich, Feb. 2, 1880.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Gas Committee of the Corporation of Birmingham are prepared to receive TENDERS for the TAR to be produced at their various Works for a period of One, Three, or Seven years, from the 30th of June next.
The quantities produced in 1879 were as follows:—

Saltley Works	8,500 Tons.
Windsor Street Works	5,000 "
Adderley Street Works	2,500 "
Swan Village Works	3,000 "
Total	19,000 Tons.

The Committee will receive tenders, either at a fixed price per ton, or at a price to be calculated on a sliding scale, varying with the selling price of products.
The Corporation are prepared to let on lease a portion of their surplus land, on which Tar Works could be erected.
Forms of tender may be obtained on application to me.
EDWIN SMITH, Secretary.
Old Square, Birmingham.

BOROUGH OF ST. HELEN'S.

EXHIBITION OF GAS COOKING AND HEATING STOVES, GAS-ENGINES, BURNERS, AND OTHER APPARATUS, AND INVENTIONS FOR THE ECONOMIC USE OF GAS FOR DOMESTIC AND MANUFACTURING PURPOSES.

THE Gas and Lighting Committee of this Borough have determined to hold an EXHIBITION of the above for three days—viz., Wednesday, Thursday, and Friday, the 10th, 11th, and 12th of March next, at the Town Hall, St. Helen's.

The Committee will provide space and gas free of charge, together with the necessary preparations for the gas connections.

Intending exhibitors will be furnished with printed conditions and forms of allotment of space, and any further information may be obtained upon application to the Manager, Mr. Jos. Hall.

Early application is invited, as no allotment will be made after Thursday, the 26th inst.

Corporation Gas Office, St. Helen's, Feb. 7, 1880.

GAS COALS.

THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the Supply of Best GAS COALS, for One, Two, or more years, delivered at their respective Works as follows:—

Alongside the Stepney Works in the Regent's Canal.
" Wapping " River Thames.
" Poplar " Bow Creek.

The annual quantities to be spread over each year, and to be distributed between the works in the following proportions:—

Year ending June 30, 1881—	
Stepney	85,000 Tons.
Wapping	18,000 "
Total	103,000 Tons.
Year ending June 30, 1882—	
Stepney	85,000 Tons.
Wapping	35,000 "
Poplar	44,000 "
Total	164,000 Tons.
Year ending June 30, 1883—	
Stepney	85,000 Tons.
Wapping	35,000 "
Poplar	55,000 "
Total	175,000 Tons.

And in proportion for following years.

A specification of particulars of deliveries, terms of payment, and general conditions of contract, to be had on application.

Tenders, endorsed "Coal Tenders," to be forwarded not later than the 3rd of March next.

The Directors reserve the right of accepting any tender in part or in whole, and do not bind themselves to accept the lowest or any tender.

By order of the Board,
H. D. Ellis, Secretary.

Gas-Works, Ben Jonson Road, Stepney,
Feb. 7, 1880.

GEORGE'S

Patent Gas Calorizer

FOR

WARMING AND VENTILATING.

Manufacturers:

J. F. FARWIG & CO.,

36, QUEEN STREET, CANNON ST., LONDON.

Now ready, price 18s., bound in cloth, gilt lettered,

THE THIRTY-FOURTH VOLUME

(JULY to DECEMBER, 1879,)

OF THE

JOURNAL OF GAS LIGHTING, WATER SUPPLY, AND SANITARY IMPROVEMENT.

CLOTH CASES, GILT LETTERED,
For binding Vol. XXXIV., may be obtained,
Price . . . 2s. 6d.

London:
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, Westminster.

IN THE PRESS.

THIRD EDITION, "Improvements in Gas Apparatus." By GEORGE ANDERSON.

With 22 Illustrations of Retorts, Purifiers, &c., &c.

Re-written and enlarged, with a chapter on the "Purification of Gas," by Mr. R. H. Patterson, late Metropolitan Gas Referee.

To be had of Walter King, "Journal of Gas Lighting" Office, 11, Bolt Court, Fleet Street, E.C.; or of the Author, 35A, Great George Street, Westminster.

N.B.—Orders received before Feb. 14—when the type will be scattered—4s.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to

Frank M'Gedy, Secretary.

126, Chancery Lane, London.

TO TAR DISTILLERS.

THE Directors of the Wakefield Gas-light Company are prepared to receive TENDERS for the Purchase of the Surplus TAR made at their Works, for the period of One year, from the 1st of April next. Approximate quantity, 900 tons.

Sealed Tenders, endorsed "Tar Tender," to be sent in not later than the 21st of February next.

By order,
John W. Whitaker, Manager and Secretary.

Gas Office, Feb. 2, 1880.

PORTSEA ISLAND GAS COMPANY.

THE Directors are desirous of receiving TENDERS for the following MOUTHPIECES, Tangye's patent, in good order and nearly new; taken down where West's system is now being adapted:—

Sixty 21 in. by 15 in. Oval on back to 18 in. Circular in front.

Ten 16 in. Circular.

Seventy 20 by 13 D's; all 15 in. deep from flange to face, with Sockets cast on for 6-in. Ascension-Pipes. Suitable for Beds of Sevens or Fives.

S. B. Darwin, Secretary.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

110 Mouthpieces, D-shape, 13 in. by 22 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair Mitre Wheels.

Set of four Purifiers, 12 ft. by 12 ft. by 4 ft., with 18-in. Centre-Valve (Cockeys), and Connections and Lift complete.

Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

Two 12-in. Governors, by Wright, London, with 12-in Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. Morland, Engineer.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

The Imperial Meter Company's

GAS GOVERNORS

Are throughout of the most substantial construction, and of ample dimensions for dealing with the largest quantities that can be passed through mains of the respective sizes.

KING'S ROAD, ST. PANCRAS, N.W.

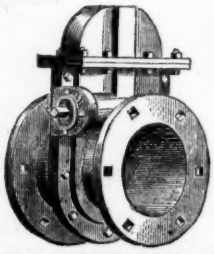
Formerly also (Walter Ford) at Gray's Inn Road.

B. DONKIN & Co.'s

IMPROVED GAS-VALVES

TRADE MARK.

WITH WROUGHT-IRON PINIONS.



These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.

Also Sole Makers of
J. BEALE'S NEW PATENT GAS EXHAUSTERS,
and Makers of
STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
BYE-PASS VALVES, SCREW WATER-VALVES, &c.

B. DONKIN & Co., BERMONDSEY, LONDON, S.E.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens in Action and *out* of Action.

A Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

M. DAVIS & CO., 27, Wellclose Square, LONDON, E.,

COMMERCIAL GLASS WORKS.

BEST OPAL SHEET GLASS, IN CASES OF 200 FEET.

150 Y	7d. per foot.	26 Y	11d. per foot.
21 Y	9d. „	32 Y	1s. 3d. „

Enamelled Sheet Glass, Flint and Opal, 1s. 2d. Coloured Glass and Opal, 1s. 6d. to 2s. 6d. per foot.

GAS GLASSES OF ALL DESCRIPTIONS ON HAND; SPECIAL PRICES FOR QUANTITIES.

SMEATON'S TRAPLESS CLOSETS.

MESSRS. W. SMEATON & SONS,

HOT WATER AND SANITARY ENGINEERS.

PATENTEES AND INVENTORS OF THE
TRAPLESS, THE D TRAP, AND EDDYSTONE CLOSETS.
Also the New
ECLIPSE COMBINATION CAST LEAD TRAP.

The Price will be half of the old-fashioned D Trap, it being cast all in lead, without a Joint. Send at once for an Illustrated Price List to their Wholesale and Retail Agent,

G. R. GLENIE,

WALBROOK HOUSE, 37, WALBROOK, LONDON, E.C.

A large Discount to the Trade and Shippers. Estimates Given and Contracts Taken

R. DEMPSTER AND SON'S

WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,

MADE BY SPECIAL MACHINERY.

SCRUBBERS FILLED WITH BOARDS,

On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

ROSE MOUNT IRON-WORKS,

ELLAND, Near HALIFAX.

London Offices: 2, SUFFOLK LANE, CANNON STREET, E.C.

E. & W. H. HALEY,

IRONFOUNDERS & MAKERS OF

CAST-IRON PIPES

FOR

GAS, WATER, & STEAM.

LISTER HILLS FOUNDRY,
BRADFORD, YORKSHIRE.

W. C. HOLMES & Co.,

ENGINEERS AND CONTRACTORS

FOR

GAS AND WATER-WORKS,

WHITESTONE IRON-WORKS,

HUDDERSFIELD.

REFERENCES TO UPWARDS OF 400 WORKS.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. Romans has for upwards of 30 years been practically engaged in th ¿Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

Analysis and Prices forwarded on Application.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

„ „ Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

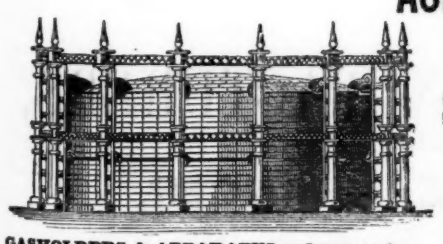
MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES BLOCKS, AND CHIMNEY-TOPS.

ASHMORE & WHILE,

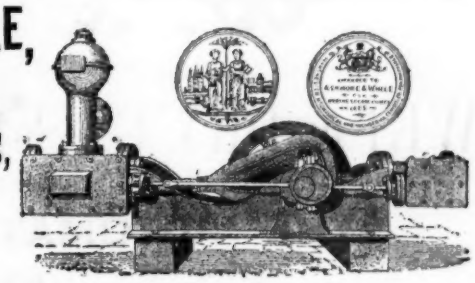


HOPE IRON-WORKS,

STOCKTON-ON-TEES,

ENGINEERS

AND MAKERS OF



GASHOLDERS & APPARATUS, references to	. .	**100 Engineers.**
ROOFS	„	. . **52 Erections.**
BRIDGES & GIRDERS . .	„	. . **250** „
BOILERS	„	. . **43** „
PURIFIERS & SCRUBBERS. .	„	. . **115** „

ALSO THE

"SLIDE-VALVE" STEAM-PUMP,

For Water, Tar, Grains, Soap, Thick Fluids, Chemical, Gas, or Iron Works, Mines, Breweries, Ships, &c. No possibility of Valves sticking, as they are actuated by a positive motion from an eccentric.

References to Forty-five Users.

THE

"WARNER & COWAN" METER.

THIS Meter stands alone and unrivalled, as the only thoroughly reliable, and continuously accurate, measurer of gas.

The drum is properly described as "self-regulating," its construction being such that it maintains practical uniformity of discharge per revolution throughout all changes of water-line.

All other Wet Meters either vary with a varying water-line (because their drums are *not* self-regulating), or are complicated by "compensating" arrangements in the futile and *now wholly superfluous attempt* to make the water-line unvarying.

Loss of water by evaporation or otherwise, neglect to supply it at the proper time, or to the correct degree (so necessary for the registration of other Meters), produces no change in the measurement of the WARNER & COWAN. Even in the extreme case of a prolonged neglect to water leading to the extinction of the lights, nothing but inconvenience would arise; whereas with an ordinary Wet Meter this inconvenience would, in such a case, not only occur (and much sooner, because of the shorter range of float), but would be preceded by a considerable alteration of capacity, and therefore incorrect registration.

"Compensating" Meters, depending as they all do upon complex arrangements (extraneous to the drum), for maintaining the water-line, are not only inadequate to the duty, but unreliable in action.

The drum of a Meter being the measurer, ought to be *in itself* a true and unvarying measure. This, the WARNER & COWAN drum *alone* is.

W. & B. COWAN,

(ESTABLISHED 1827,)

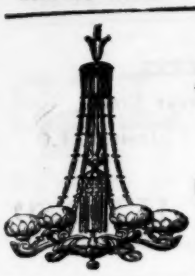
WET & DRY GAS-METER MANUFACTURERS,

Sole Licensees and Manufacturers of

THE AUTOMATIC PRESSURE CHANGER,

[WM. COWAN'S PATENT.]

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

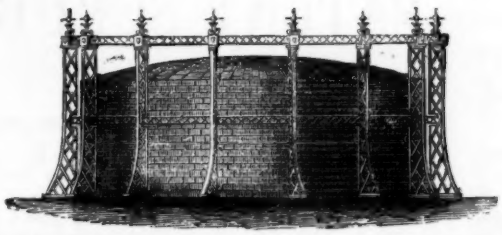
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

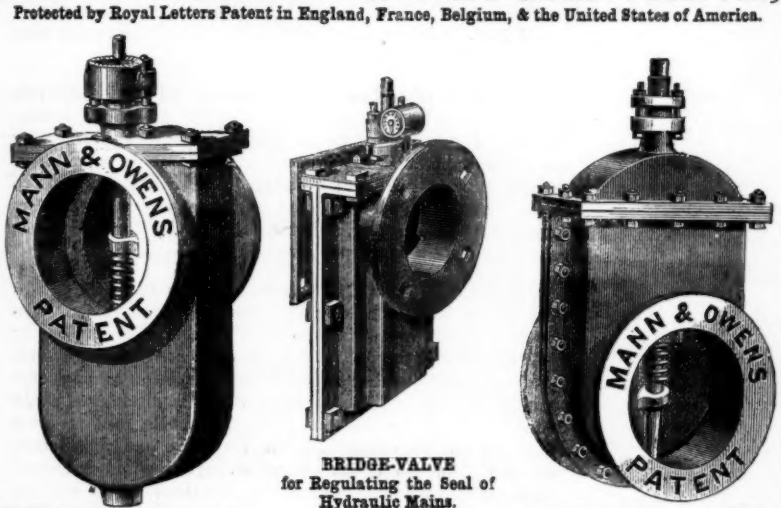
HYDRAULIC, GAS, AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

Sole Manufacturers of MANN & OWENS'

PATENT SCREW & CAM GAS-VALVE,

Protected by Royal Letters Patent in England, France, Belgium, & the United States of America.



BRIDGE-VALVE for Regulating the Seal of Hydraulic Mains.

VALVE to OPEN DOWNWARDS. VALVE to OPEN UPWARDS.

The SPECIAL ADVANTAGES of MANN AND OWENS' PATENT VALVE are as follows:—

1. Its non-liability to become set fast through varying temperature or from the deposit from crude gas. 2. It is made absolutely gas-tight by the simple action of a screw and cam. 3. Inconvenience through the breakage of springs or wedges setting fast cannot arise. 4. The face of the Valve is scraped and cleaned of any solid matter at each operation of opening or closing.

The Valve can be had to work either in a Vertical or Horizontal position.

Every Valve is carefully tested under pressure, and warranted perfectly sound and gas-tight.

INSTRUCTIONS FOR ORDERING.

State whether required for above or below ground, if Double Flange or Socket and Spigot Valves are wanted, or with loose Flanged Socket and Spigot pieces.

The Prices include Indicators to show extent to which Valve is open.

Also makers of PILLAR-VALVES, SELF-ACTING BYE-PASS VALVES, OUTSIDE RACK AND PINION VALVES, HYDRAULIC-MAIN VALVES, DISC-VALVES, &c.

Every description of Pumping Apparatus, Hydraulic Lifts, &c., suitable for use in Gas-Works, made to order.

PRICES, SIZES, AND FULL PARTICULARS, WITH COMPLETE ILLUSTRATED CATALOGUE, FURNISHED ON APPLICATION.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

SANDELL AND SON,

PUBLIC ACCOUNTANTS,

2, GREAT GEORGE STREET, WESTMINSTER.

SANDELL AND SON having been engaged during the past 25 years in Gas Companies Accounts, either in Preparing or Investigating Statements for Parliamentary Applications, Arbitrations, and otherwise, offer with confidence their Services for similar purposes.

Mr. ROBERT DEMPSTER,

CONSULTING GAS ENGINEER,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations is both extensive and reliable.

ALFRED LASS, F.I.Accts.,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

HARPER & MOORES,

PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

ESTABLISHED 1836.

The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture. SILVER MEDAL, PARIS, 1878.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1¼ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

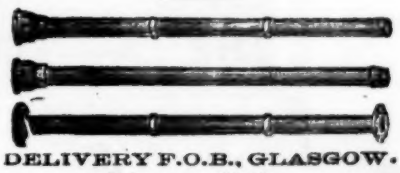
NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

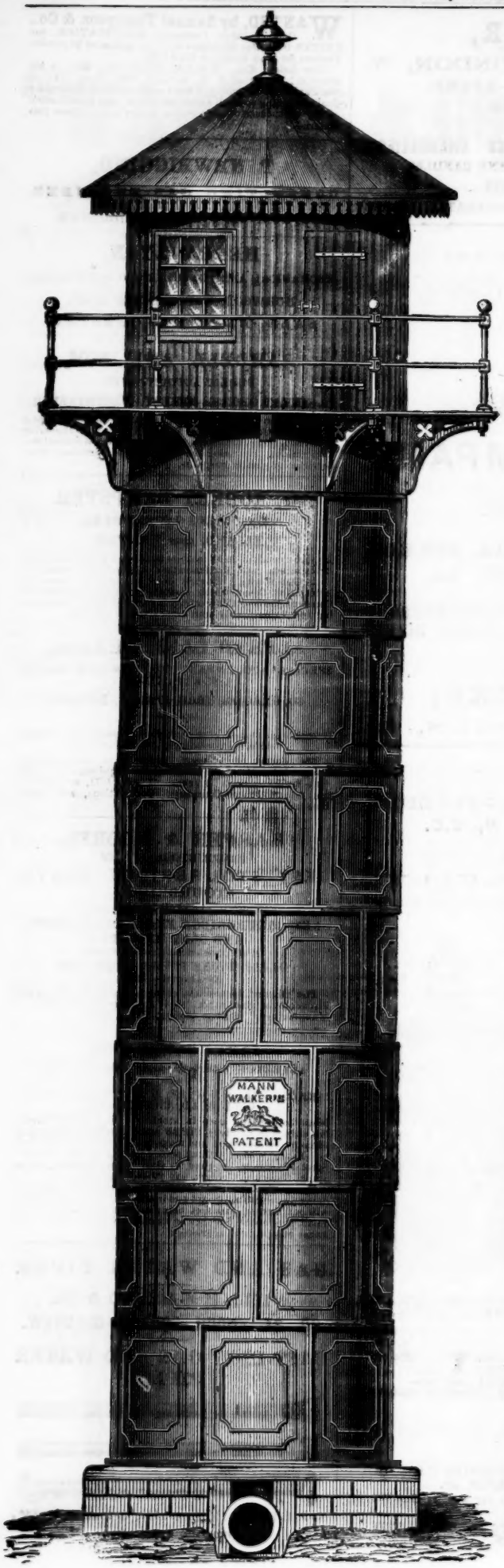
30, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B., GLASGOW.

Prices on application.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

THE

SILBER LIGHT COMPANY,

MANUFACTURERS OF

SILBER'S PATENT TUBULATED BURNERS

FOR

COAL OR AIR GAS,

And of SILBER'S BAT'S-WING GAS-BURNERS and every variety of Gas-Fittings.

ALSO MANUFACTURERS OF

EVERY DESCRIPTION OF LAMPS (burning Colza Oil, Petroleum, Paraffin, or Kerosene) FOR DOMESTIC PURPOSES, STREETS, RAILWAY STATIONS, SHIPS, &c., &c.

FIG. 1.
Silber's Patent Tubulated Gas-Burner, drawn full size.

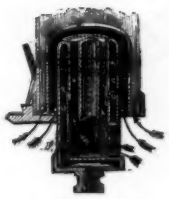


FIG. 2.
Section of Silber's Tubulated Gas-Burner, the arrows indicating the currents of air to the flame —two externally and two internally.

Dr. Wallace, F.R.S.E., Gas Analyst of Glasgow, says of this burner: "It gives the steadiest flame of any Argand yet constructed."

FIG. 3.
Silber's Tubulated Gas-Burner with glass bulb or vase beneath, and with larger inlet than aggregate outlet area, by which means the illuminating power for 5 cubic feet of 16-candle-light gas is increased one candle.

The Silber Tubulated Gas-Burner offers the following advantages over existing Argand Gas-Burners:—

1. It affords more light for 5 cubic feet of gas.
2. It is made of brass, and so put together that there is no liability of its melting, or coming to pieces in any other way, as burners made of soft metal are apt to do.
3. It is capable of burning from 4 to 7 cubic feet of gas per hour (by using chimneys of different lengths), and although the consumption be increased, **the illuminating power per cubic foot of gas remains almost quite constant.**
4. With the glass bulb or vase, as shown in fig. 3, the illuminating power for 5 cubic feet of 16-candle-light gas is **increased one candle.**

FIG. 4.
Silber's Bat's-Wing Gas-Burner.
The results obtained from this Burner are amongst the best obtained from any flat-flame Burners yet introduced.

FULL PARTICULARS & ENGRAVINGS

Forwarded on application to

THE SILBER LIGHT COMPANY,

49, WHITECROSS STREET,

LONDON, E.C.

FIG. 5.
Silber's Bat's-Wing Burner, with Opal Gas Moon.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND CO., 21, Lime Street, LONDON, E.C.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

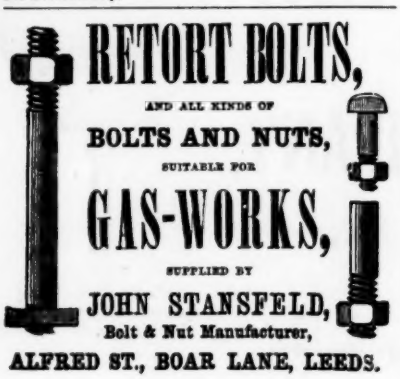
Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.



RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES:

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

THE

THAMES BANK IRON COMPANY,

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS AND ALL KINDS OF GAS-WORKS APPARATUS,

SOCKET-PIPES FOR GAS OR WATER PURPOSES,

FLANGE-PIPES FOR STEAM,

RAIN-WATER PIPES AND GUTTERS,

HOT-WATER BOILERS, PIPES, AND CONNECTIONS,

LAMP-COLUMNS, LAMPS, LAMP-FRAMES, WROUGHT TUBES, &c.,

HOT WATER AND HOT AIR APPARATUS,

Erected complete on the most Improved Principles.

TRADE MARK.

"VICTORIA,"

The Cheapest and Best

LEATHER BELTING

IN LONDON.

The Leather is of the Best Possible Quality, and English Oak Tanned.

Sample Orders of over £5, Carriage Paid to nearest Railway Station.

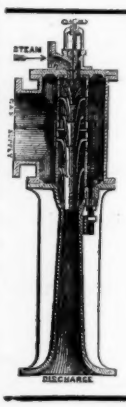
Is Manufactured expressly for

J. C. R. OKES,

39, QUEEN VICTORIA STREET, LONDON, E.C.,

And can only be obtained from him or his Agents.

PRICES ON APPLICATION.



KÖRTING'S STEAM-JET EXHAUSTER,

IMPROVED CLELAND'S PATENT.

UPWARDS OF 400 IN USE.

CLELAND'S PATENT SLOW-SPEED CONDENSER, AND CLELAND'S PATENT STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,

OR TO

GERALD J. TUPP, Creek Engine-Works,

Middle Mall, Hammersmith, London, W.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

THE WIGAN COAL & IRON COMPANY,

LIMITED,

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

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SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

THE PORTER-CLARK PROCESS

FOR THE

SOFTENING AND FILTRATION OF WATER IN LARGE QUANTITIES, WITHIN SMALL SPACE, AT SMALL COST.

(*See* JOURNAL *of Jan.* 6, 1880.)

In an article upon the Swindon Water Supply, the *Wilts and Gloucestershire Standard* of Aug. 9, 1879, says:—

"All praise is due to the Company who have thus provided a water supply that, if it can be equalled, we are safe in saying cannot be surpassed. . . . For the information of all caterers for public health, we explain that the mode of so effectually Purifying and softening the really good and naturally wholesome water is the 'PORTER-CLARK PROCESS.' 'CLARK'S PROCESS' was known to be chemically admirable; the improvements, however, effected by Mr. Porter, mechanically, are curious as they are perfect."

The filtration is exquisite, and everything arrested is removed daily.

The Visiting Justices of the Kent County Asylum at Chartham on Aug. 29, 1879—

Resolved, "That a favourable testimonial be given to Mr. Porter for his system down to the present time, and that the Clerk forward a copy of this resolution to Mr. Porter." (50,000 gallons daily.)

The Visiting Justices of the Middlesex County Asylum, Banstead Downs, under date of Sept. 12, 1879—

Certify, "That up to the present time the 'PORTER-CLARK WATER-SOFTENING PROCESS,' which has been in operation at this Asylum for about two years, has satisfactorily answered the purposes for which it was intended." (60,000 gallons daily.)

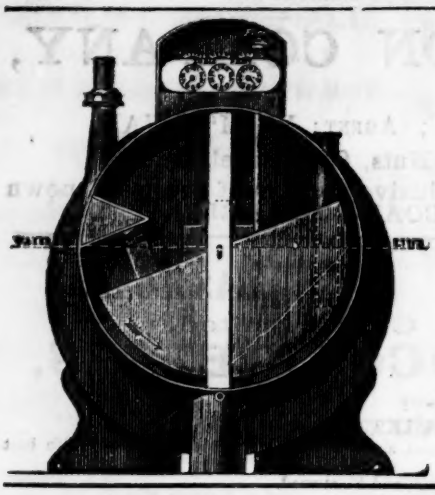
(See *The Times*, Aug. 23, 1877, Paper by Mr. F. J. Bramwell, F.R.S., Meeting of British Association, Plymouth.)

The Proprietor of the *Daily Chronicle* and *Lloyd's Weekly News* writes, Sept. 17, 1879—

"The 'PORTER-CLARK WATER-SOFTENING PROCESS,' erected by you at my paper-mill at Sittingbourne, continues to give satisfaction, and I no longer have any trouble with my steam-boilers. I am not yet working the filters up to their full capacity, only softening about 80,000 gallons per 24 hours, whereas I could easily do more than 120,000 gallons. I may add that it only requires one man to attend to the whole operation."

PATENTED BY JOHN HENDERSON PORTER, C.E.,

1 & 2, TUDOR STREET, BLACKFRIARS, LONDON, E.C.



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(SANDERS AND DONOVAN'S PATENT.)

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Over 120,000 in action.

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THE GAS-METER COMPANY, LIMITED,

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Branch Manufactories at DUBLIN and OLDHAM.

CIRCULAR TO GAS COMPANIES AND OTHERS.

Stourbridge, Jan., 1880.

DEAR SIRS,—As the time for ordering stock for your general requirements for this year is approaching, we beg to call your attention to the various articles of our manufacture, and to solicit your early commands.

Fire-Clay Gas-Retorts.—As some of our friends appear to prefer these *machine made*, we have arranged to supply machine-made Retorts at same price as hand-made ones. At the same time, although it is to our advantage to supply machine-made, we do not recommend them, for the reason stated to you in our Circular of November, 1878. We have a very large stock of Retorts, all in good condition, and of such an assortment that we could supply any size on receipt of order.

Fire-Bricks and Fire-Clay Settings of all Shapes and Sizes.—We have a large and varied stock, or could make to special design at short notice.

Staffordshire Blue Bricks and Paving Bricks.—We shall be glad to submit prices and samples of these on hearing from you, with specification, and we venture to say our brand in these goods is unsurpassed. Hard Blue Paving Quarries make the best kind of Pavement for Retort-Houses, &c.

Coloured and White Glazed Bricks, Porcelain Baths, Kitchen Sinks, Corner Sinks, &c., we are making a great speciality of, and have no hesitation in saying that our glazed goods are unequalled for soundness of manufacture and purity of colour.

Earthenware Drain-Pipes, Cast-Iron Pipes, Wrought-Iron Tubing.—We should be glad of an opportunity of quoting you for these when you are in the market.

Lime, Cement, Plaster of Paris.—Our Lime Kilns at Brettell Lane are now in full operation, and we are in a position to supply any quantity of pure Lime manufactured only from the Earl of Dudley's best Limestone Beds. Our Cements and Plaster of Paris will withstand any required test.

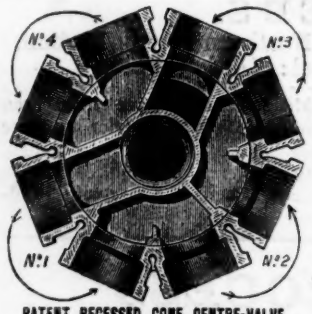
References and Testimonials.—We can furnish you with any number of these; and may mention that during the last thirty-five years we supplied most of the Gas-Works in the United Kingdom and Abroad, and that we have held contracts from Her Majesty's Government for more than Twenty years consecutively.

Awaiting your esteemed favours,

We remain, Dear Sirs, your obedient servants,

HARRIS & PEARSON.

Note.—We shall be pleased to furnish Drawings and Specifications, if desired, and shall be most happy to see you or any of your Engineers here at any time; or, if you would like to see any of our representatives or ourselves at your Works, shall be glad to wait upon you by appointment.



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Sectional Plan.

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Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

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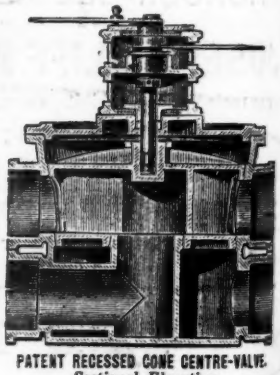

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Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE, with Opaline Reflecting Top, 12s.; with Fluted Glass Top, 10s. 6d.
Also made **EXTRA STOUT** recommended for its durability.

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By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

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